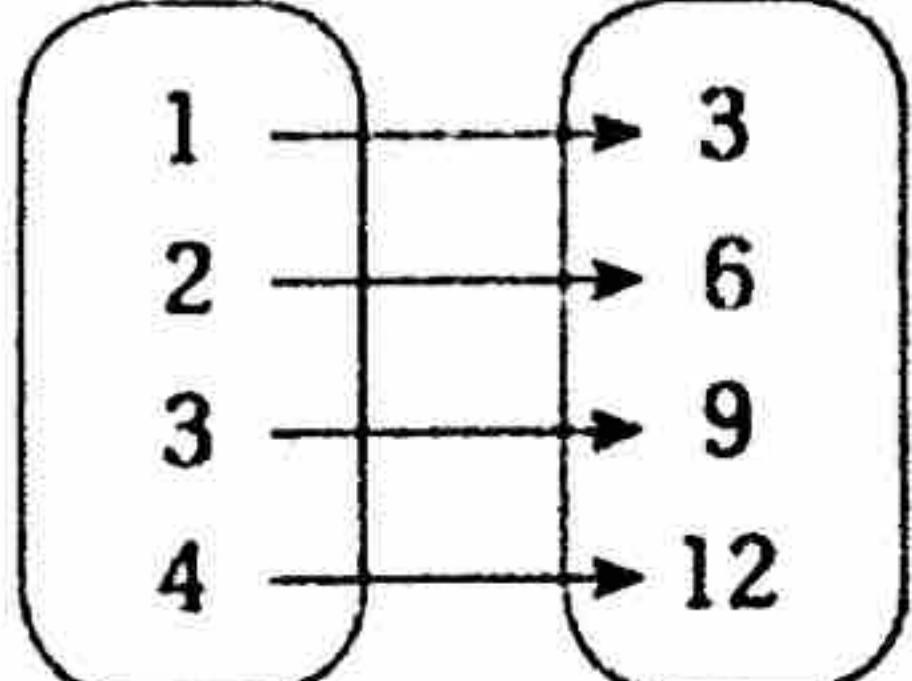
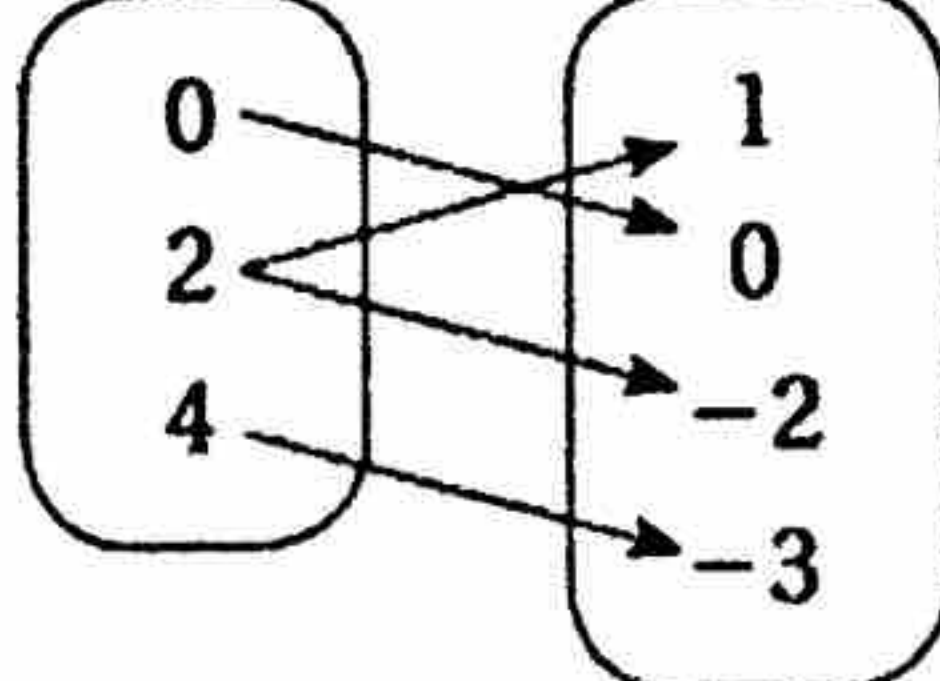
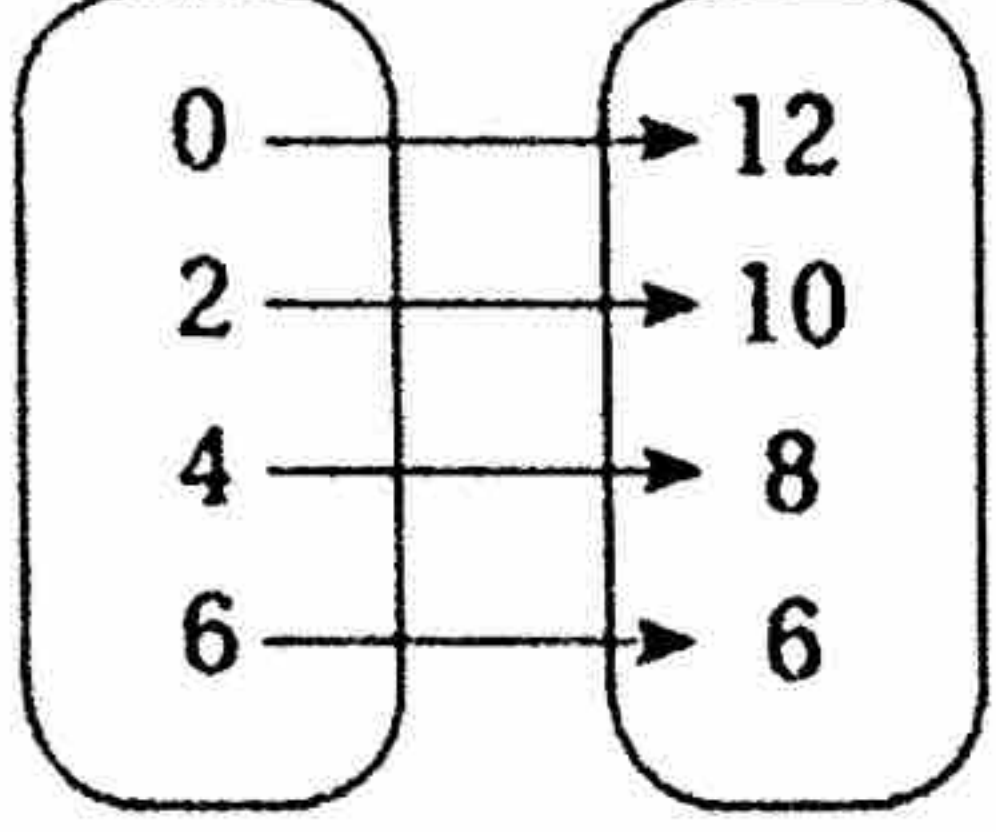
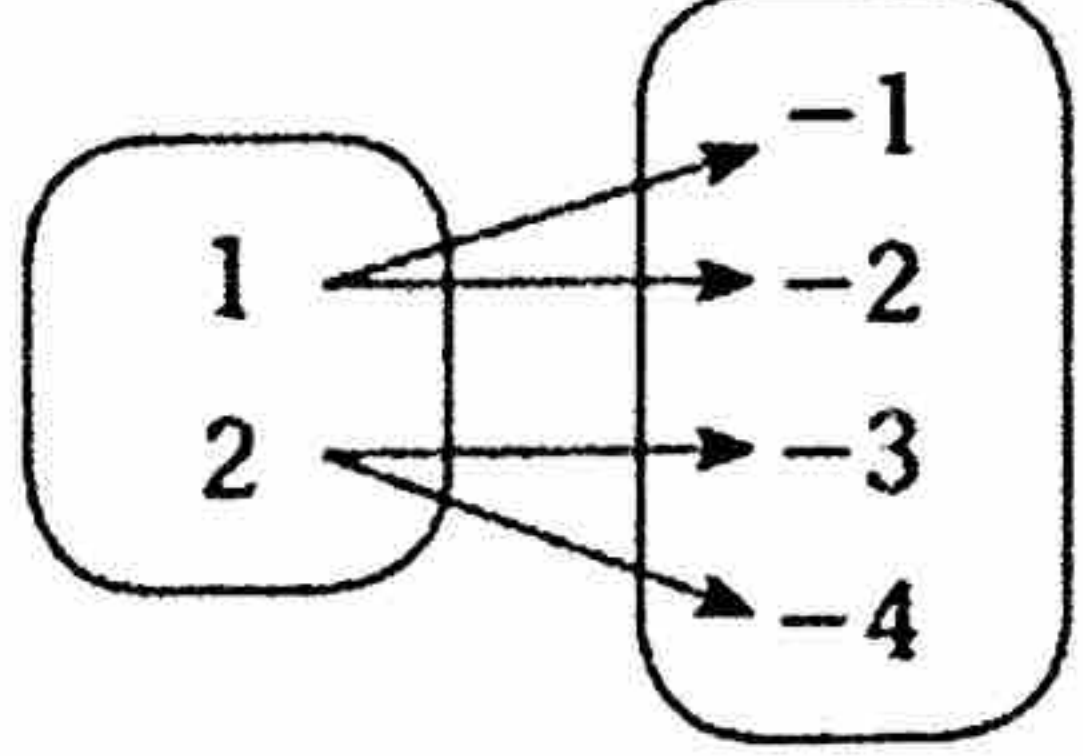
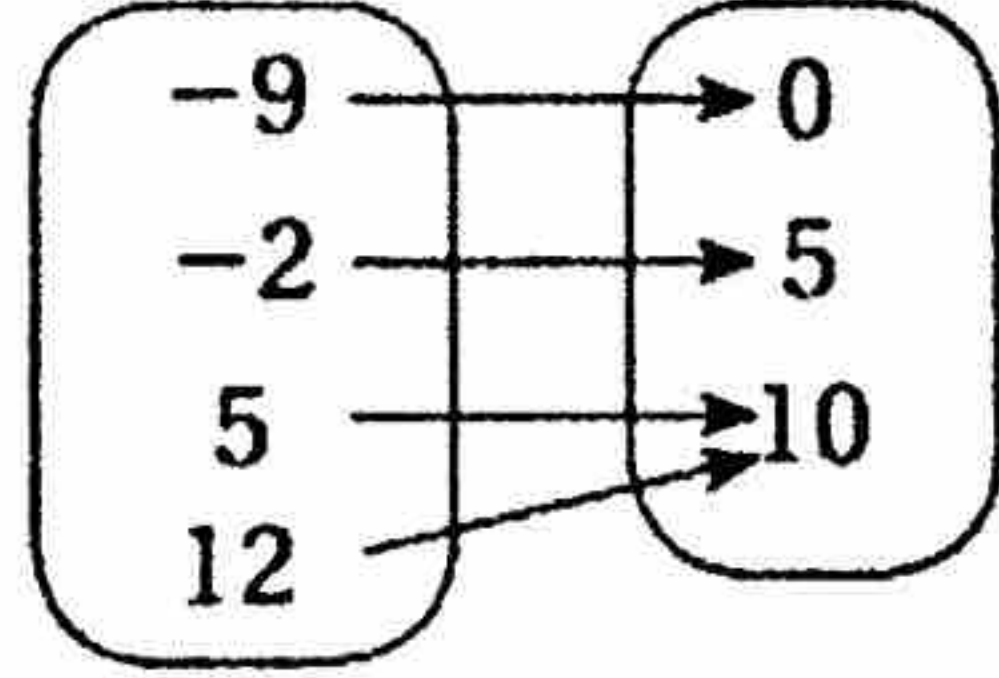
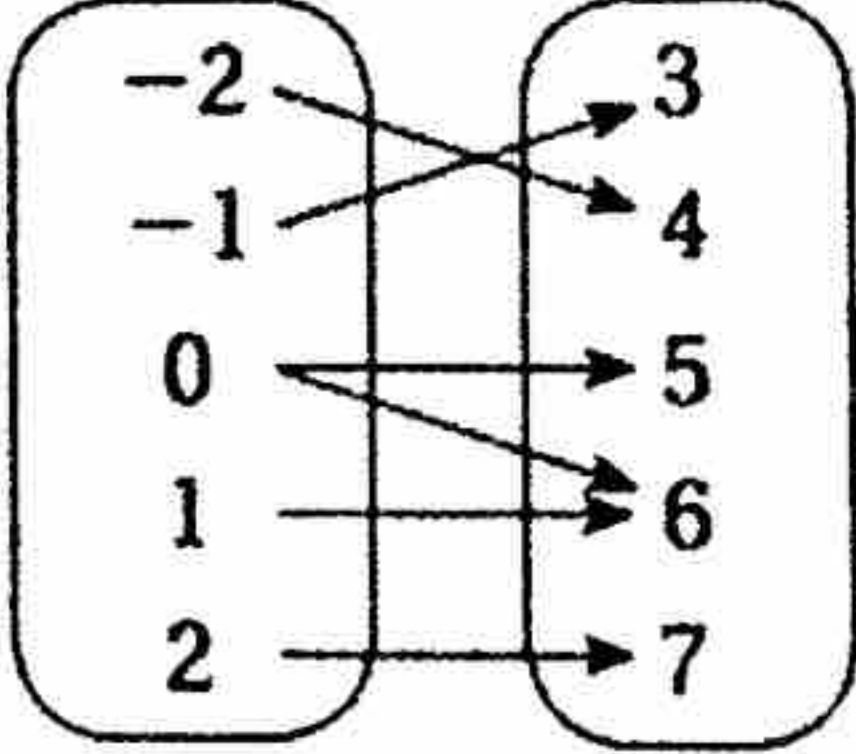
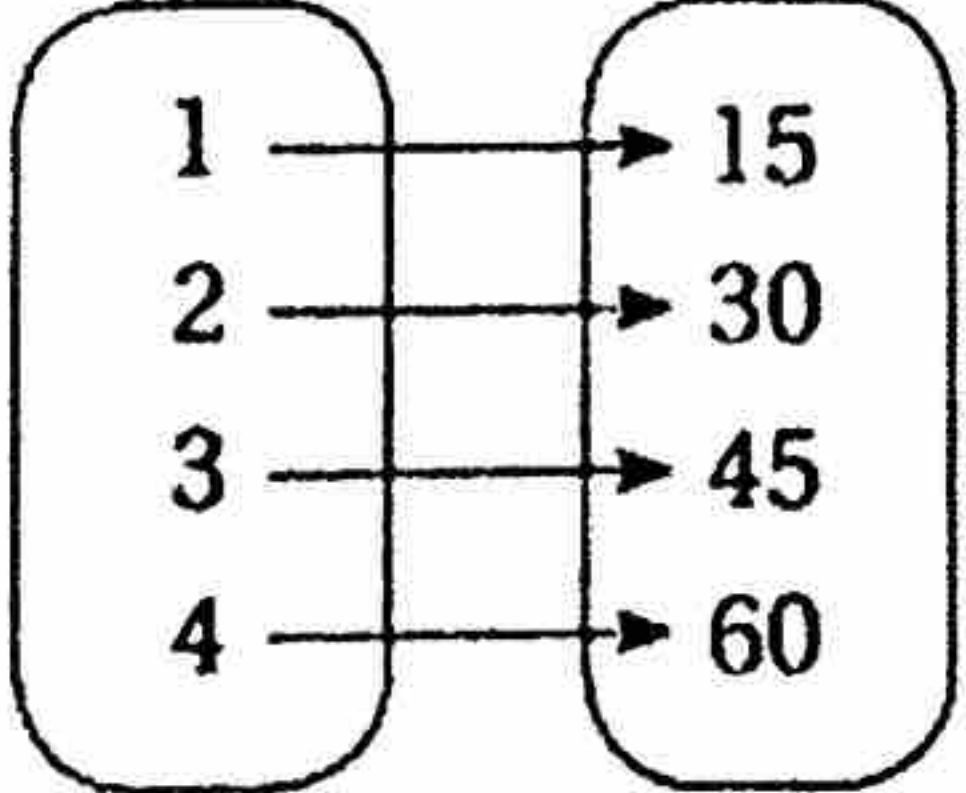


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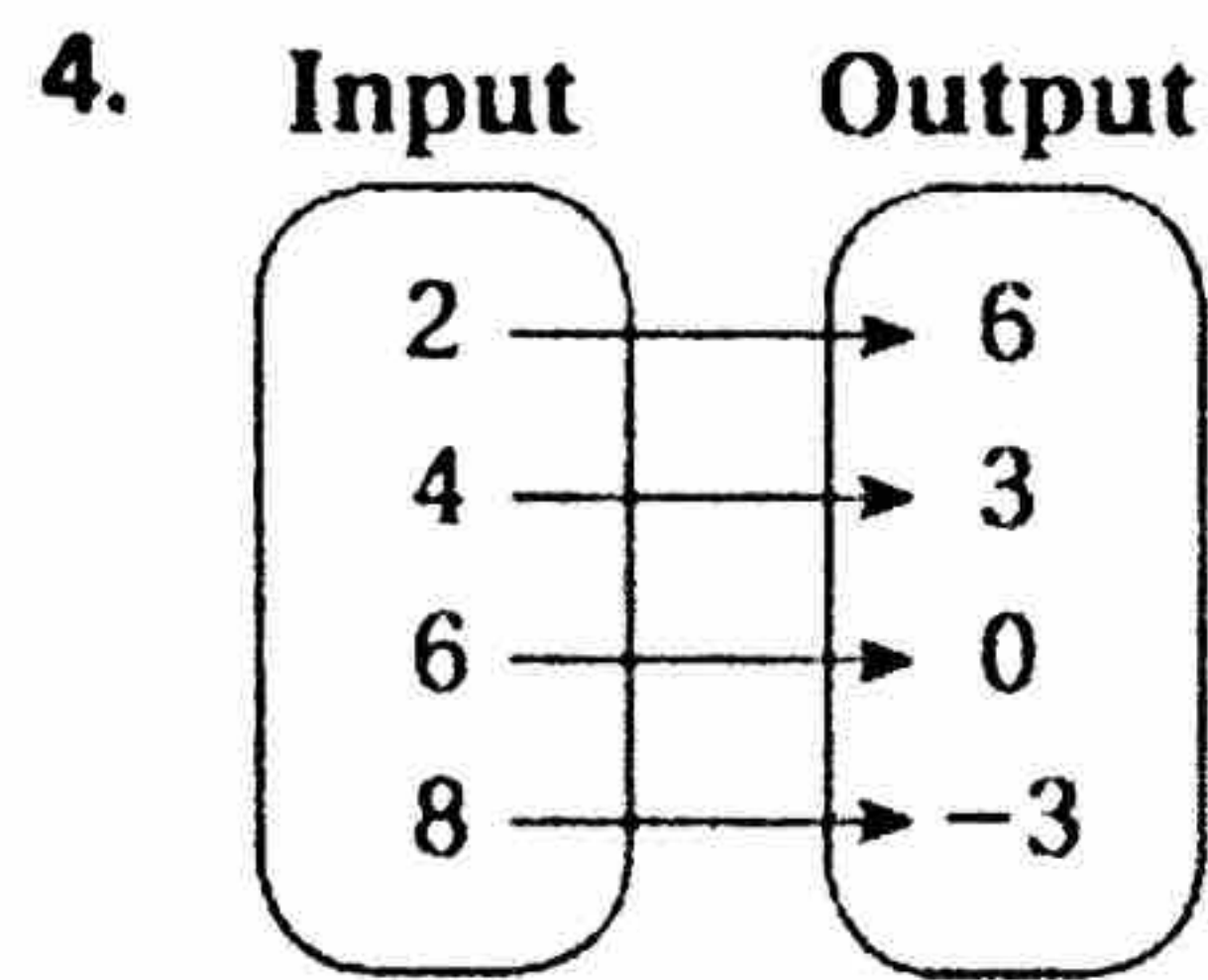
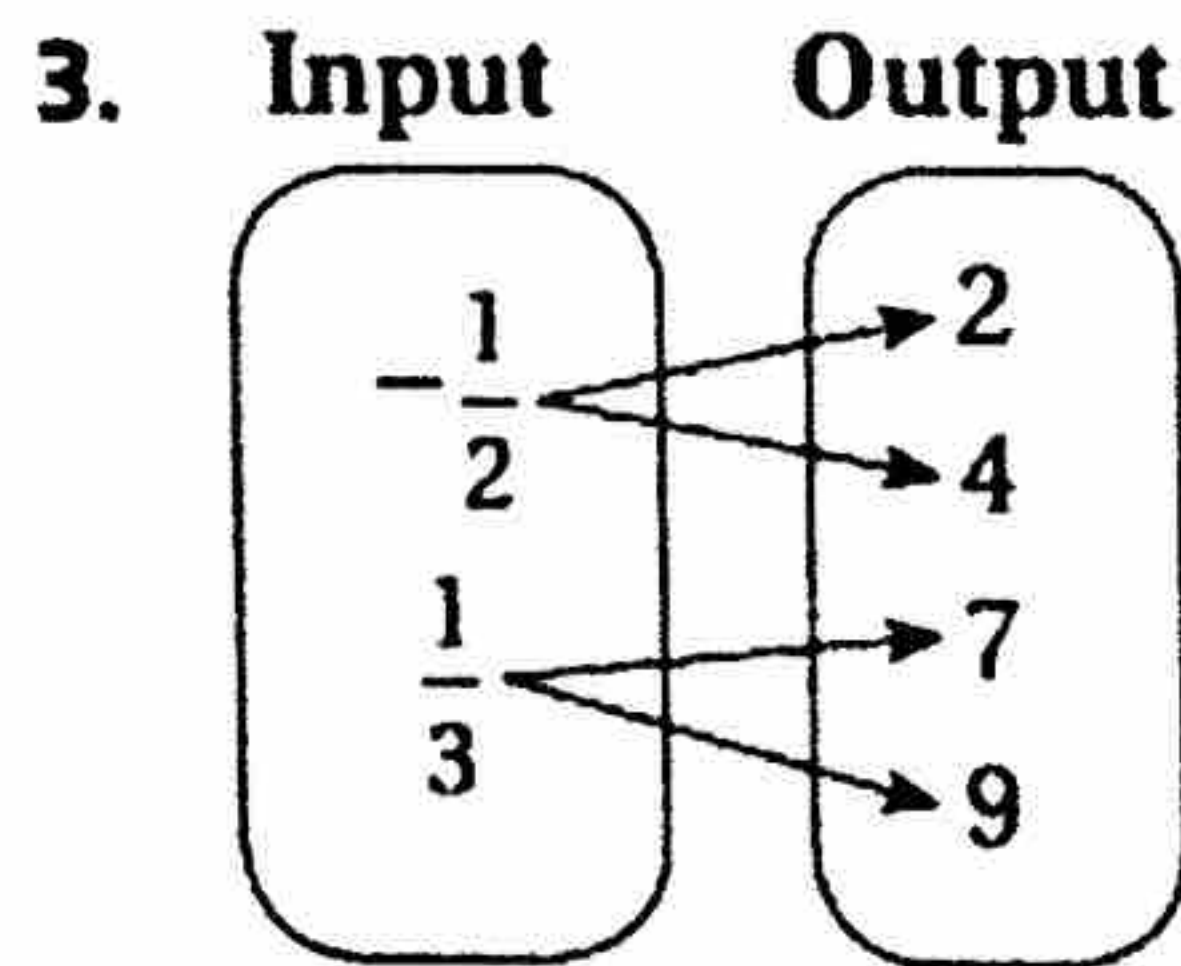
Period _____

Chapter 6 Pre-Algebra	Functions
<p>Define, evaluate, and compare functions.</p> <p>Use functions to model relationships between quantities.</p>	<p><u>MAFS.8.F.1.1</u> Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.</p> <p><u>MAFS.8.F.1.2</u> Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).</p> <p><u>MAFS.8.F.1.3</u> Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.</p> <p><u>MAFS.8.F.2.4</u> Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.</p> <p><u>MAFS.8.F.2.5</u> Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.</p>
<p>Essential Question</p>	<p>How can you use a mapping diagram to show the relationships between two data sets?</p> <p>In this lesson I am learning how to read mapping diagrams, so I can show the relationships between two data sets.</p>

<p>Example 1 Listing Ordered Pairs of a Relation</p>	<p>List the ordered pairs shown in the mapping diagram.</p> <p>a. Input Output</p>  <p>b. Input Output</p> 
<p>On Your Own</p>	<p>List the ordered pairs shown in the mapping diagram.</p> <p>1. Input Output</p>  <p>2. Input Output</p> 
<p>Example 2 Determining Whether Relations are Functions</p>	<p>Determine whether each relation is a function.</p> <p>a. Input Output</p>  <p>b. Input Output</p> 
<p>Example 3 Describing a Mapping Diagram</p>	<p>Input Output</p>  <p>Consider the mapping diagram at the left.</p> <p>a. Determine whether the relation is a function.</p> <p>b. Describe the pattern of inputs and outputs in the mapping diagram.</p>

On Your Own

Determine whether the relation is a function.



5. Describe the pattern of inputs and outputs in the mapping diagram in On Your Own 4.

Essential Question

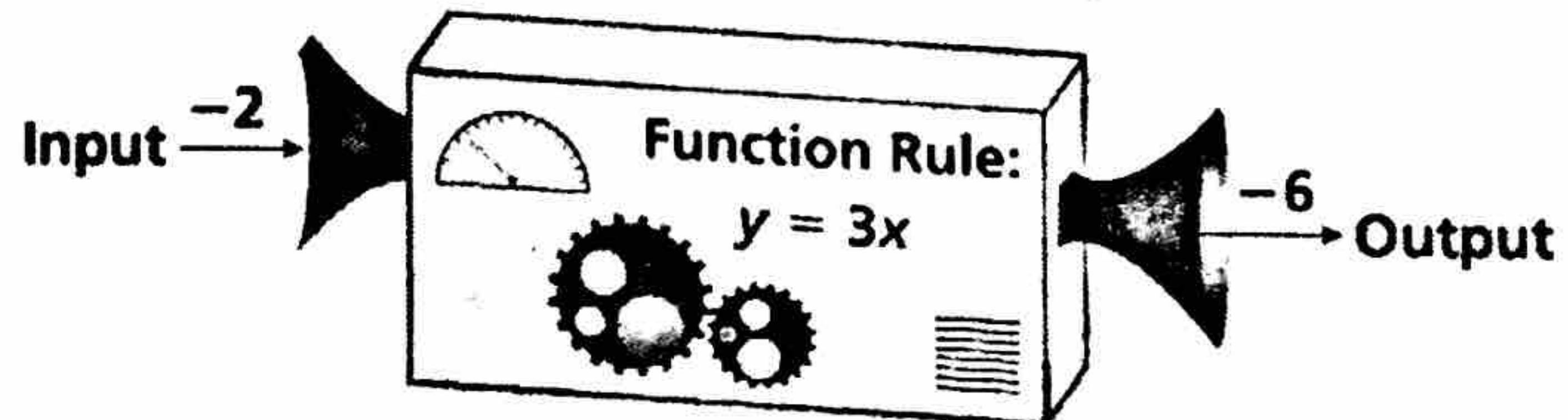
How can you represent a function in different ways?

In this lesson I am learning how to find the ratio of the change in y to the change in x , so I can find the slope of a line.

6.2 Representations of Functions

Functions as Equations

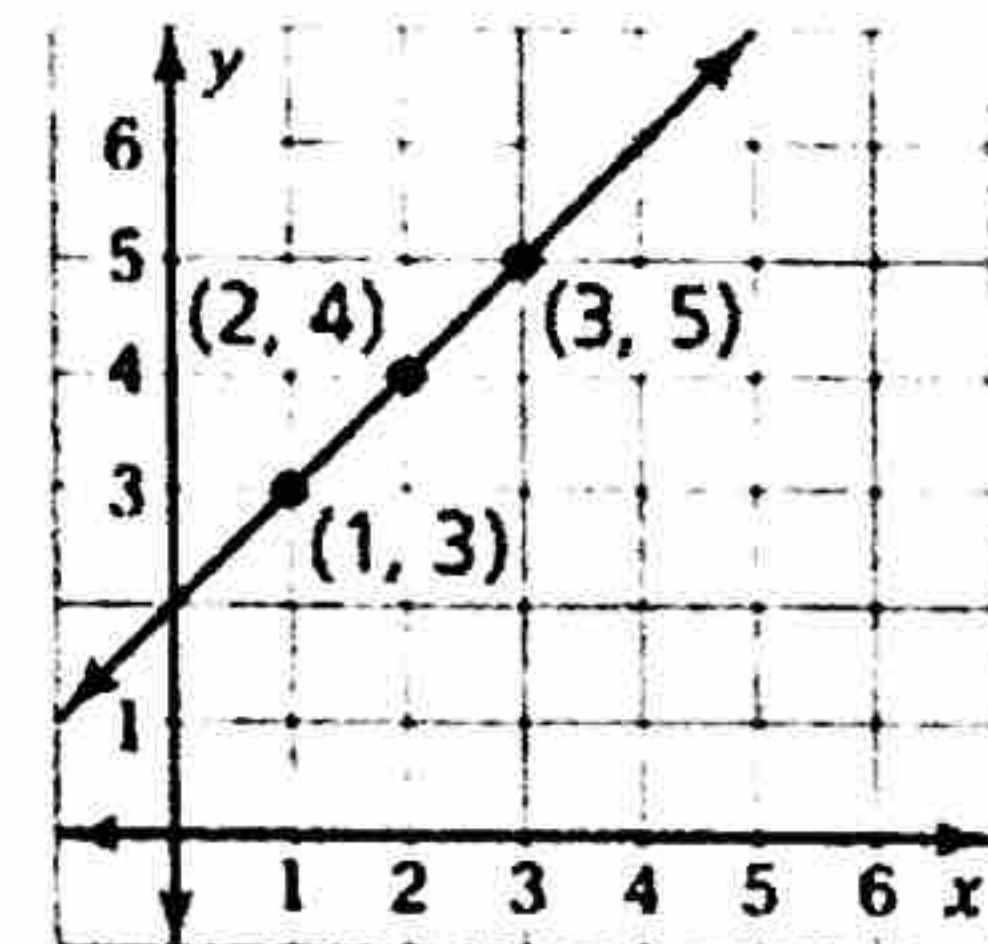
A **function rule** is an equation that describes the relationship between inputs (independent variable) and outputs (dependent variable).



Functions as Tables and Graphs

A function can be represented by an input-output table and by a graph. The table and graph below represent the function $y = x + 2$.

Input, x	Output, y	Ordered Pair, (x, y)
1	3	(1, 3)
2	4	(2, 4)
3	5	(3, 5)



By drawing a line through the points, you graph *all* of the solutions of the function $y = x + 2$.

<p>Example 1 Writing Function Rules</p>	<p>a. Write a function rule for "The output is five less than the input."</p> <p>b. Write a function rule for "The output is the square of the input."</p>
<p>Example 2 Evaluating a Function</p>	<p>What is the value of $y = 2x + 5$ when $x = 3$?</p>
<p>On Your Own</p>	<p>1. Write a function rule for "The output is one-fourth of the input."</p> <p>Find the value of y when $x = 5$.</p> <p>2. $y = 4x - 1$ 3. $y = 10x$ 4. $y = 7 - 3x$</p>
<p>Example 3 Graphing a Function</p>	<p>Graph the function $y = -2x + 1$ using inputs of $-1, 0, 1,$ and 2.</p>
<p>On Your Own</p>	<p>Graph the function.</p> <p>5. $y = x + 1$ 6. $y = -3x$ 7. $y = 3x + 2$</p>
<p>Example 4 Real-Life Application</p>	<p>The number of pounds p of carbon dioxide produced by a car is 20 times the number of gallons g of gasoline used by the car. Write and graph a function that describes the relationship between g and p.</p>

<p>Summary</p>	<p>Representations of Functions</p> <p>Words An output is 2 more than the input.</p> <p>Equation $y = x + 2$</p> <div style="display: flex; justify-content: space-around;"> <div data-bbox="563 357 978 802"> <p>Input-Output Table</p> <table border="1"> <thead> <tr> <th>Input, x</th> <th>Output, y</th> </tr> </thead> <tbody> <tr> <td>-1</td> <td>1</td> </tr> <tr> <td>0</td> <td>2</td> </tr> <tr> <td>1</td> <td>3</td> </tr> <tr> <td>2</td> <td>4</td> </tr> </tbody> </table> </div> <div data-bbox="1043 357 1415 802"> <p>Mapping Diagram</p> </div> <div data-bbox="1480 357 1830 802"> <p>Graph</p> </div> </div>	Input, x	Output, y	-1	1	0	2	1	3	2	4
Input, x	Output, y										
-1	1										
0	2										
1	3										
2	4										

<p>Essential Question</p>	<p>How can you use a function to describe a linear pattern?</p> <p>In this lesson I am learning how to write and graph linear functions, so I can describe a linear pattern.</p>
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<p>6.3 Linear Functions</p>	<p>A linear function is a function whose graph is a nonvertical line. A linear function can be written in the form $y = mx + b$, where m is the slope and b is the y-intercept.</p>
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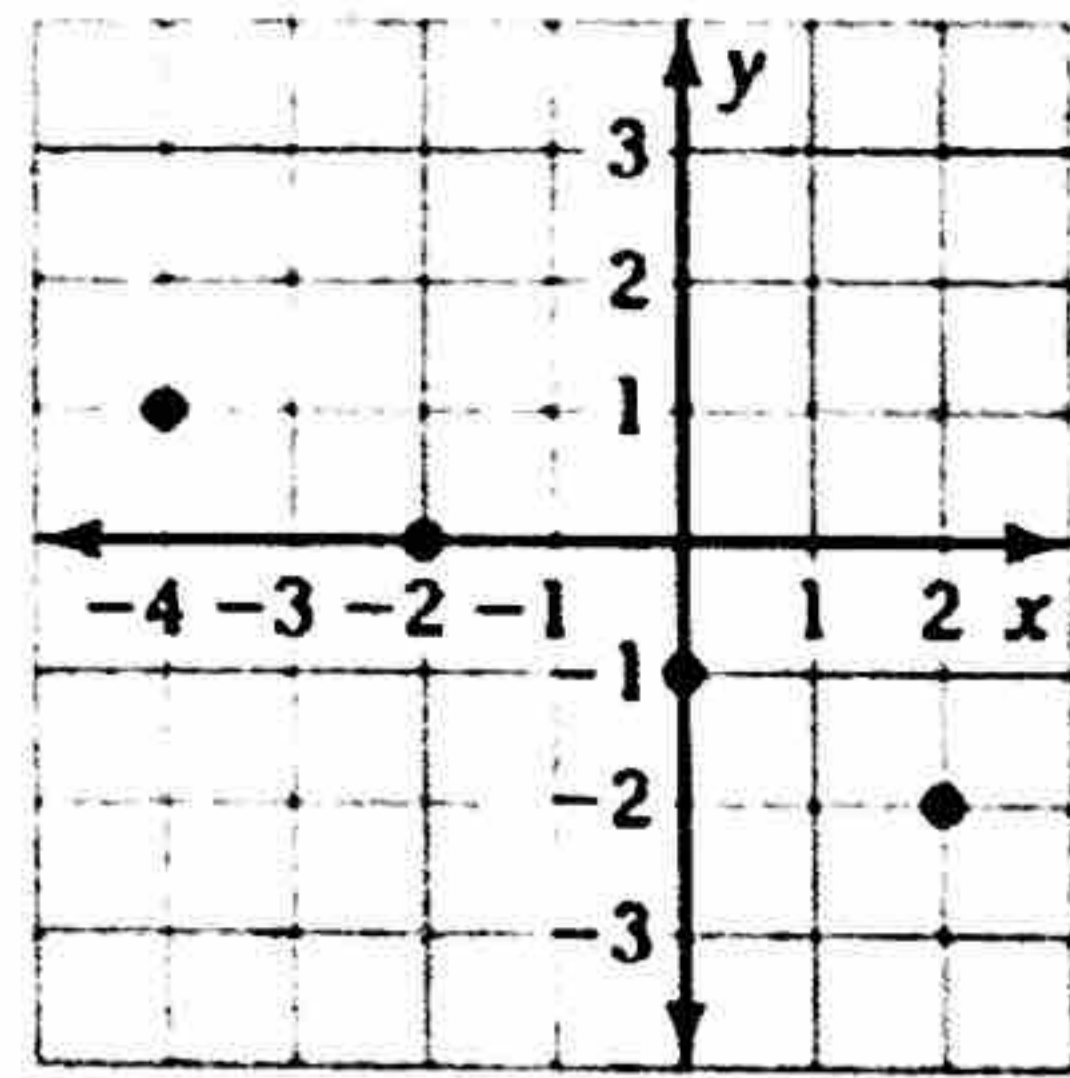
<p>Example 1 Writing a Linear Function Using a Graph</p>	<p>Use the graph to write a linear function that relates y to x.</p>
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<p>Example 2 Writing a Linear Function Using a Table</p>	<p>Use the table to write a linear function that relates y to x.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>x</td> <td>-3</td> <td>-2</td> <td>-1</td> <td>0</td> </tr> <tr> <td>y</td> <td>9</td> <td>7</td> <td>5</td> <td>3</td> </tr> </table>	x	-3	-2	-1	0	y	9	7	5	3
x	-3	-2	-1	0							
y	9	7	5	3							

On Your Own

Use the graph or table to write a linear function that relates y to x .

1.



2.

x	-2	-1	0	1
y	2	2	2	2

**Example 3
Real-Life
Application**

Minutes, x	Height (thousands of feet), y
0	65
10	60
20	55
30	50

You are controlling an unmanned aerial vehicle (UAV) for surveillance. The table shows the height y (in thousands of feet) of the UAV x minutes after you start its descent from cruising altitude.

- Write a linear function that relates y to x . Interpret the slope and the y -intercept.
- Graph the linear function.
- Find the height of the UAV when you stop the descent after 1 hour.

On Your Own

3. **WHAT IF?** You double the rate of descent. Repeat parts (a)–(c).

**Example 4
Comparing
Linear Functions**

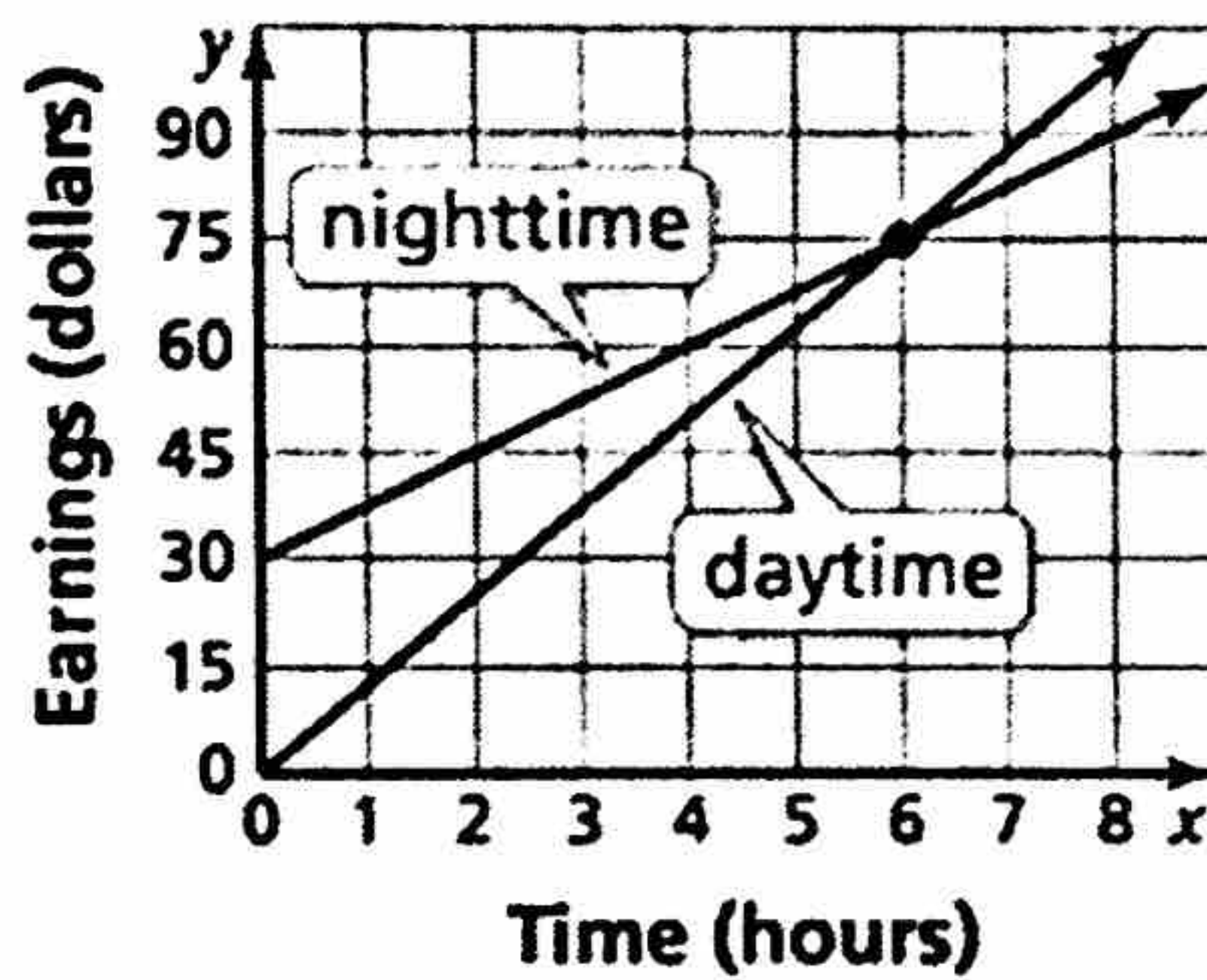
The earnings y (in dollars) of a nighttime employee working x hours are represented by the linear function $y = 7.5x + 30$. The table shows the earnings of a daytime employee.

	+1	+1	+1	
	↘	↘	↘	
Time (hours), x	1	2	3	4
Earnings (dollars), y	12.50	25.00	37.50	50.00
	↗	↗	↗	
	+12.50	+12.50	+12.50	

- a. Which employee has a higher hourly wage?

- b. Write a linear function that relates the daytime employee's earnings to the number of hours worked. In the same coordinate plane, graph the linear functions that represent the earnings of the two employees. Interpret the graphs.

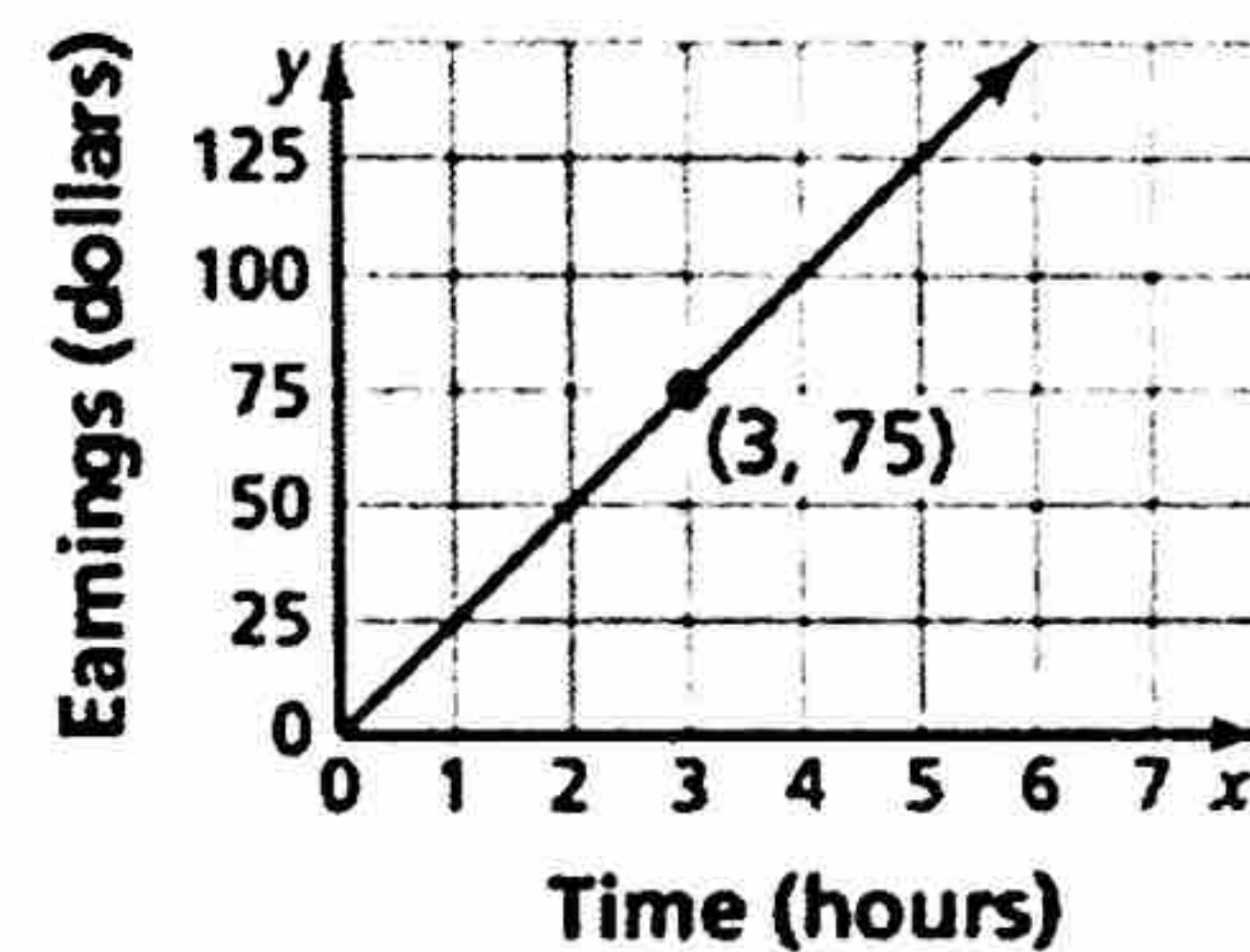
Employee Earnings



On Your Own

4. Manager A earns \$15 per hour and receives a \$50 bonus. The graph shows the earnings of Manager B.
 - a. Which manager has a higher hourly wage?
 - b. After how many hours does Manager B earn more money than Manager A?

Earnings of Manager B



Essential Question

How can you recognize when a pattern in real life is linear or nonlinear?

In this lesson I am learning about linear or nonlinear functions, so I can identify them in graphs and tables.

6.4 Comparing Linear and Nonlinear Functions

The graph of a linear function shows a constant rate of change. A **nonlinear function** does not have a constant rate of change. So, its graph is *not* a line.

Example 1 Identifying Functions from Tables

Does the table represent a *linear* or *nonlinear* function? Explain.

a.

		+3	+3	+3	
		↖	↖	↖	
x	3	6	9	12	
y	40	32	24	16	
		↘	↘	↘	
		-8	-8	-8	

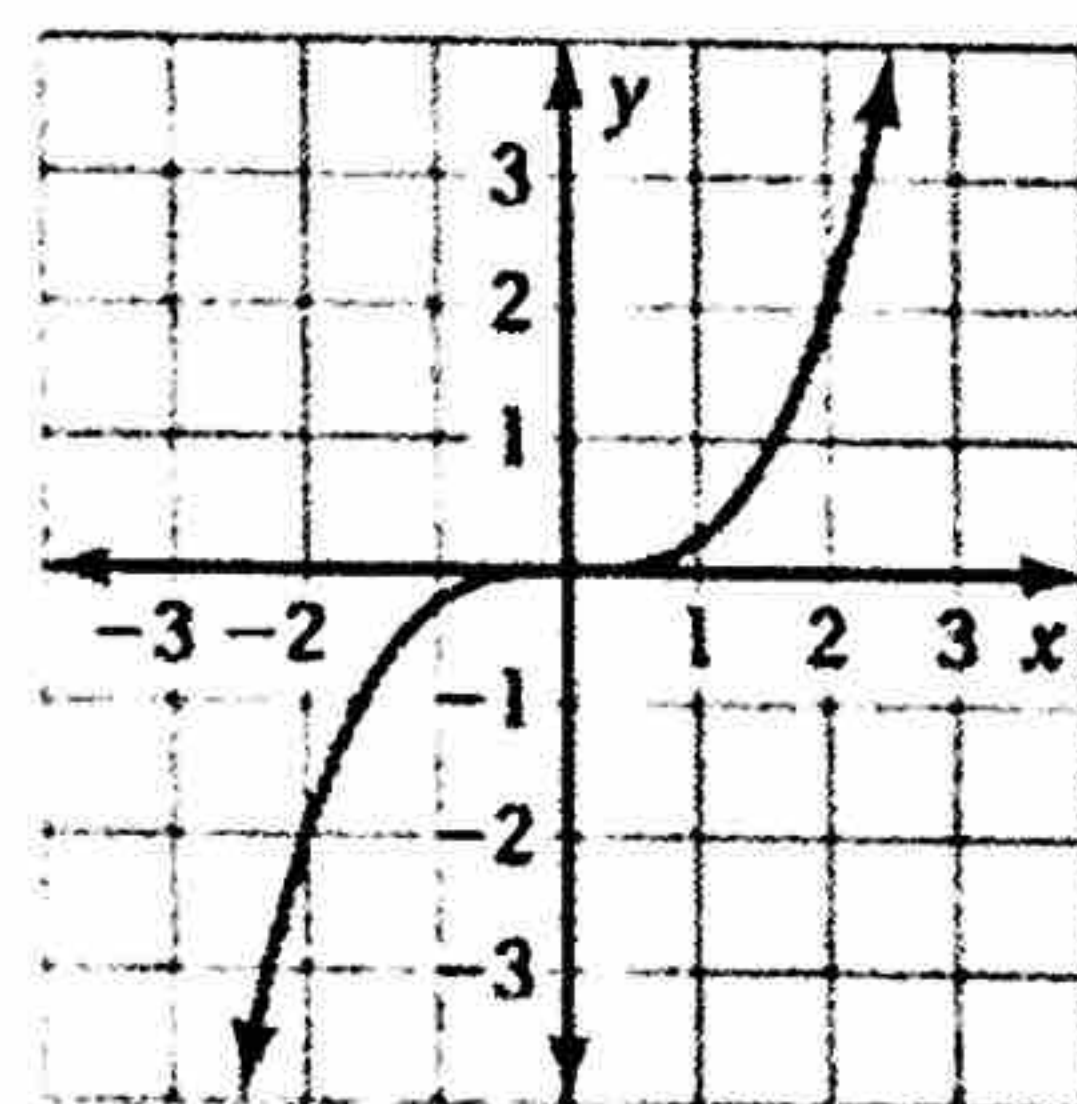
b.

		+2	+2	+2	
		↖	↖	↖	
x	1	3	5	7	
y	2	11	33	88	
		↘	↘	↘	
		+9	+22	+55	

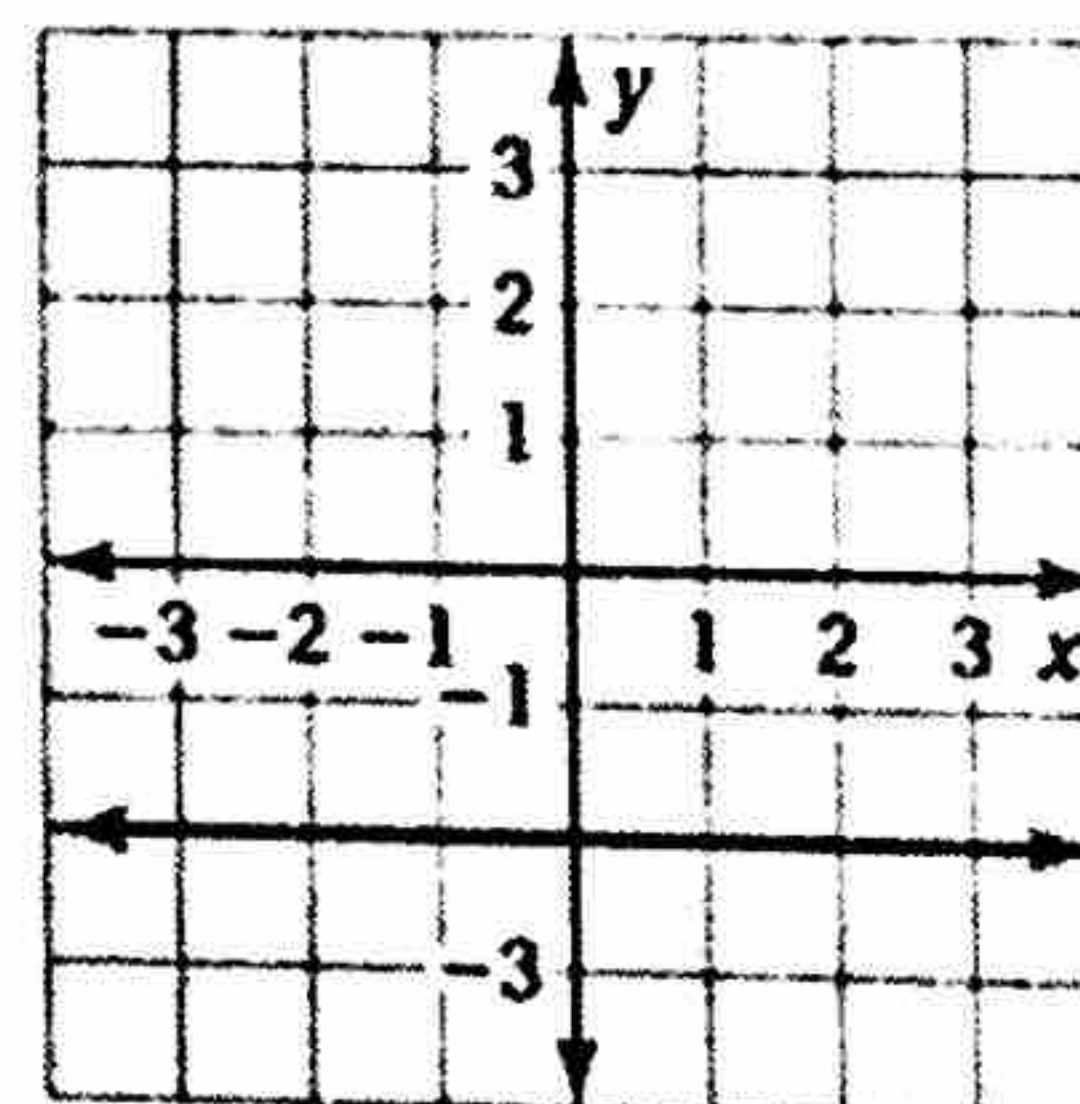
Example 2 Identifying Functions from Graphs

Does the graph represent a *linear* or *nonlinear* function? Explain.

a.



b.



On Your Own

Does the table or graph represent a *linear* or *nonlinear* function? Explain.

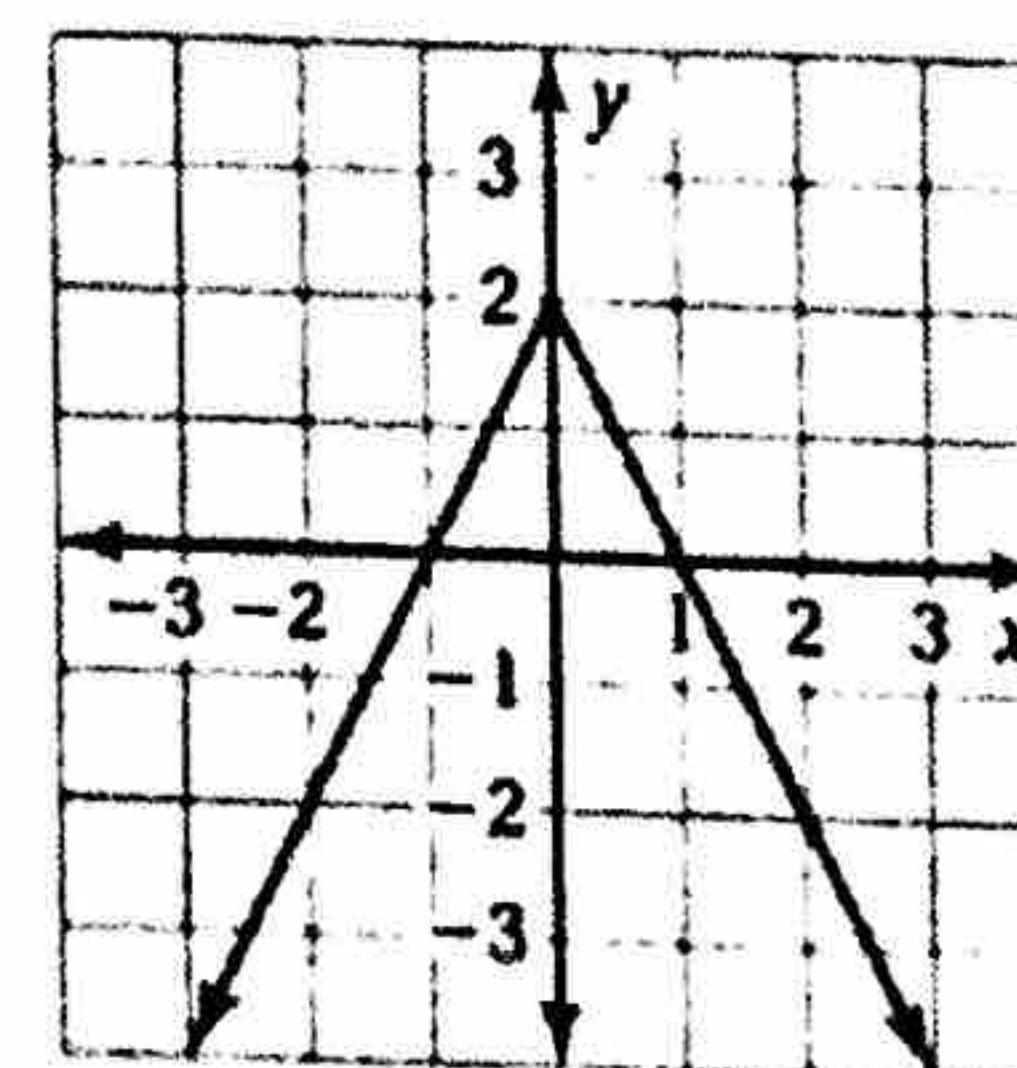
1.

x	y
0	25
7	20
14	15
21	10

2.

x	y
2	8
4	4
6	0
8	-4

3.



Example 3 Identifying a Nonlinear Function

Which equation represents a *nonlinear* function?

(A) $y = 4.7$

(B) $y = \pi x$

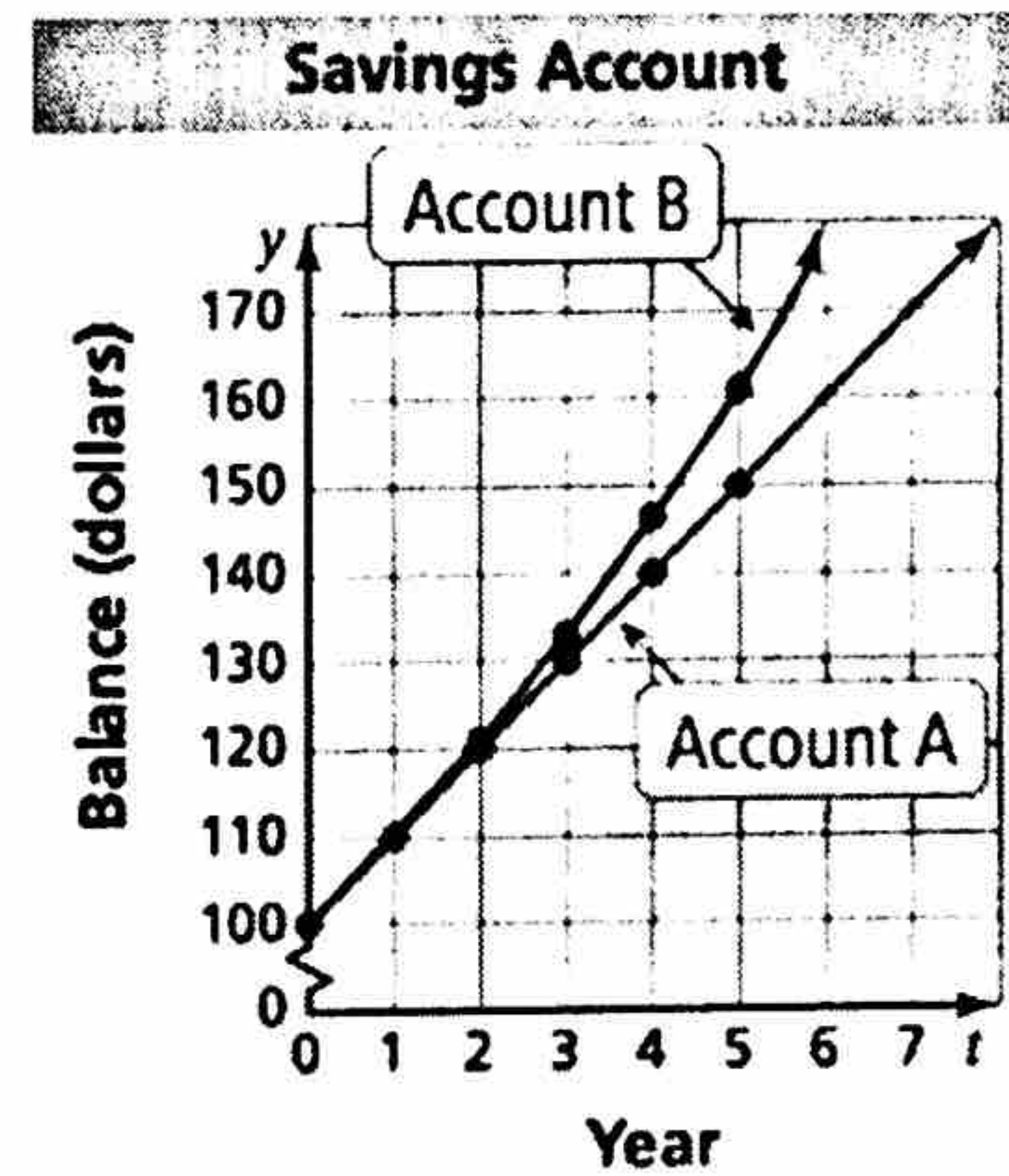
(C) $y = \frac{4}{x}$

(D) $y = 4(x - 1)$

**Example 4
Real-life
Application**

Account A earns simple interest. Account B earns compound interest. The table shows the balances for 5 years. Graph the data and compare the graphs.

Year, t	Account A Balance	Account B Balance
0	\$100	\$100
1	\$110	\$110
2	\$120	\$121
3	\$130	\$133.10
4	\$140	\$146.41
5	\$150	\$161.05



On Your Own

Does the equation represent a *linear* or *nonlinear* function? Explain.

4. $y = x + 5$

5. $y = \frac{4x}{3}$

6. $y = 1 - x^2$

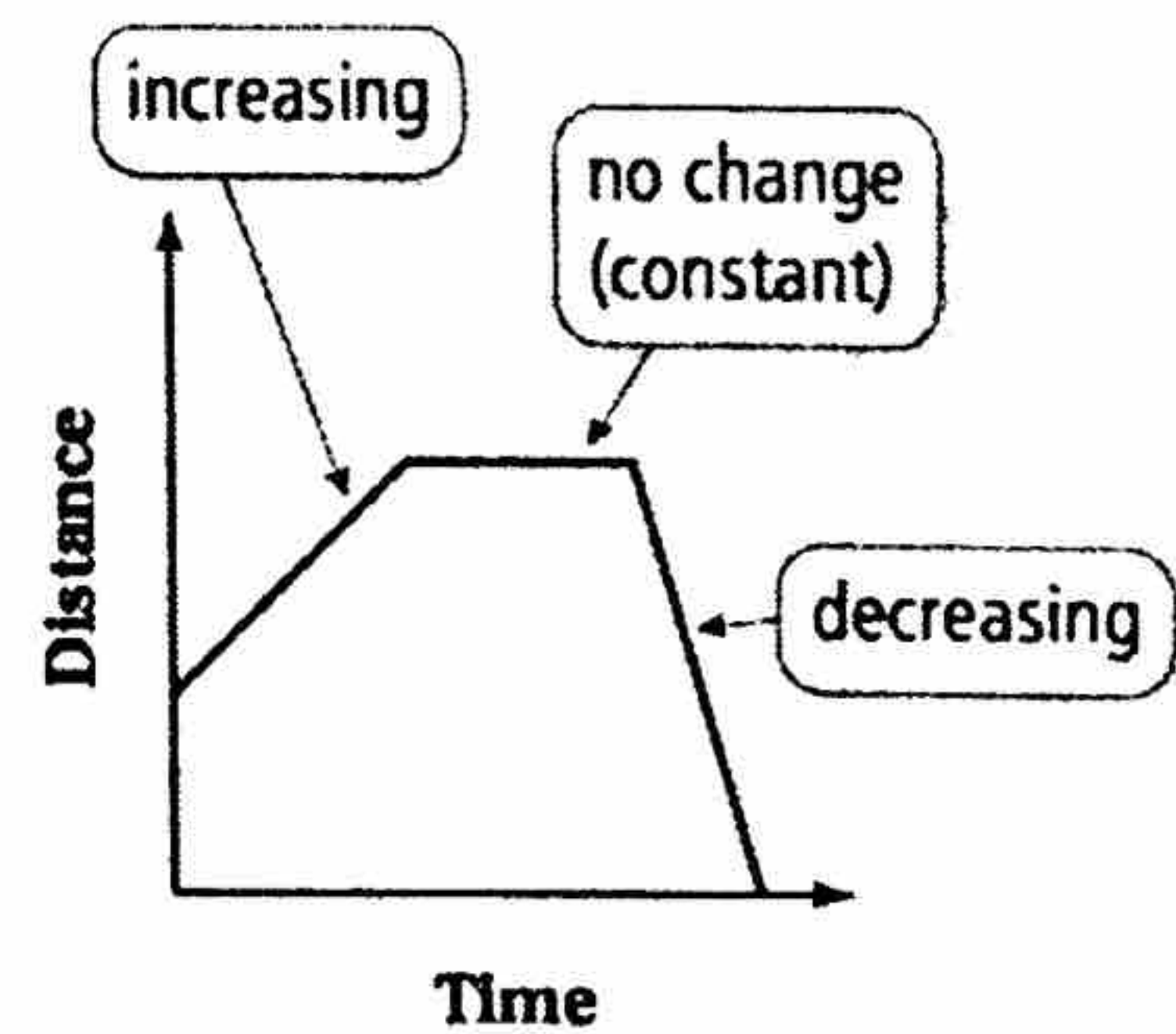
**Essential
Question**

How can you use a graph to represent relationships between quantities without using numbers?

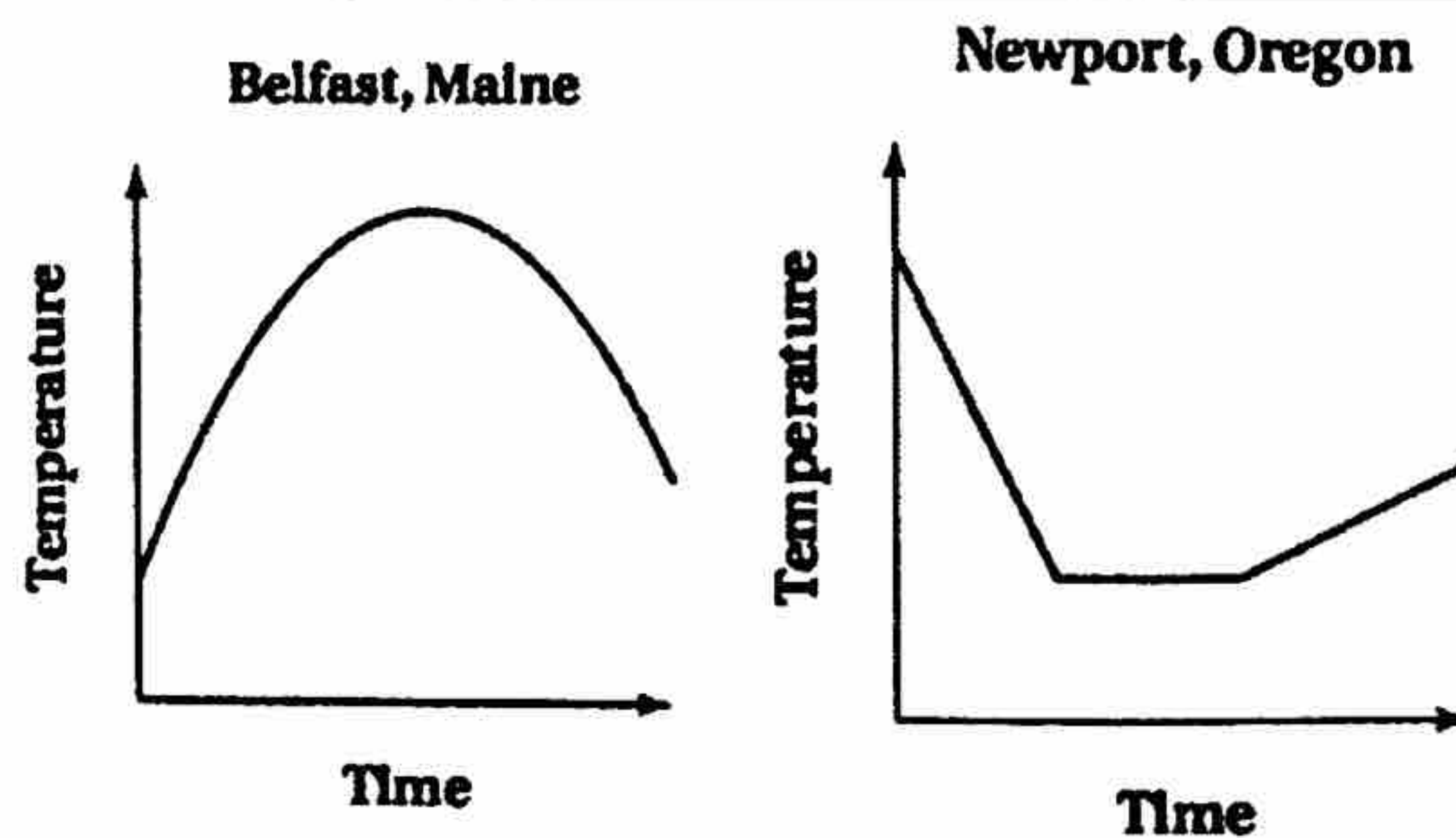
In this lesson I am learning about graphs, so I can represent relationships.

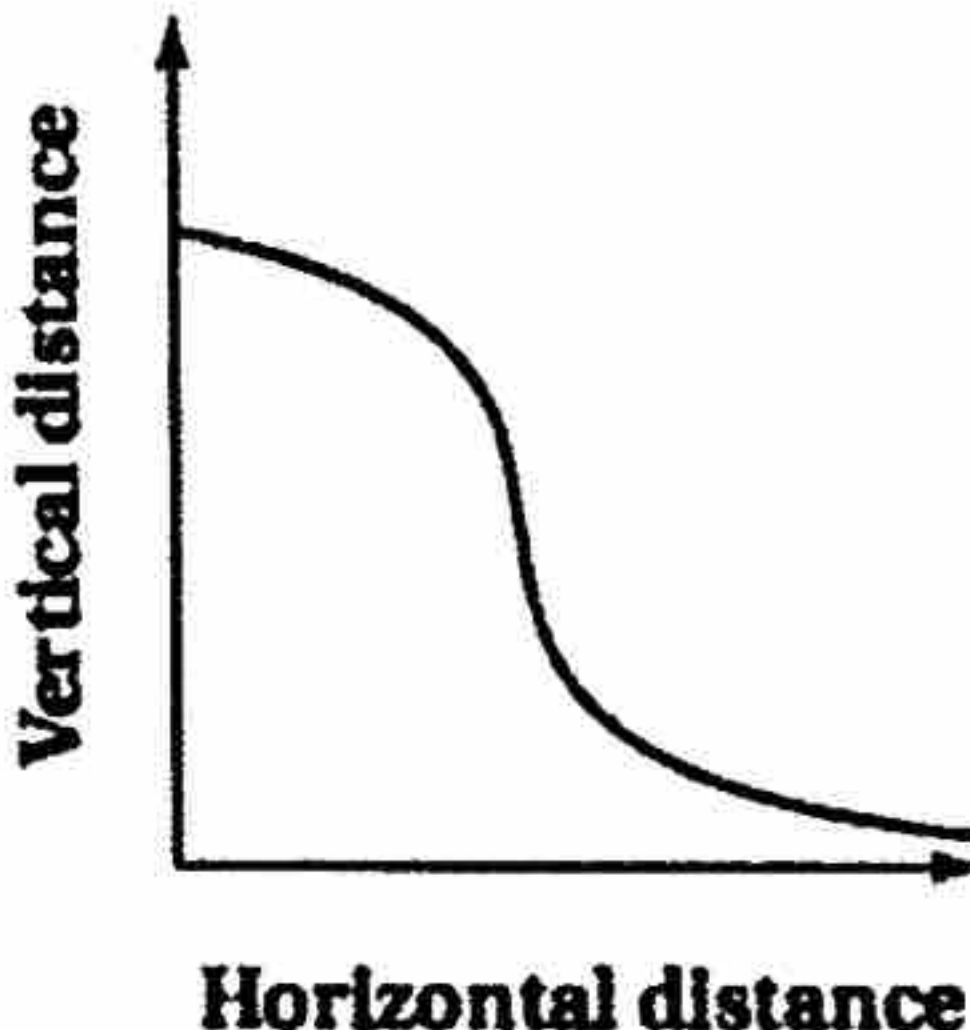
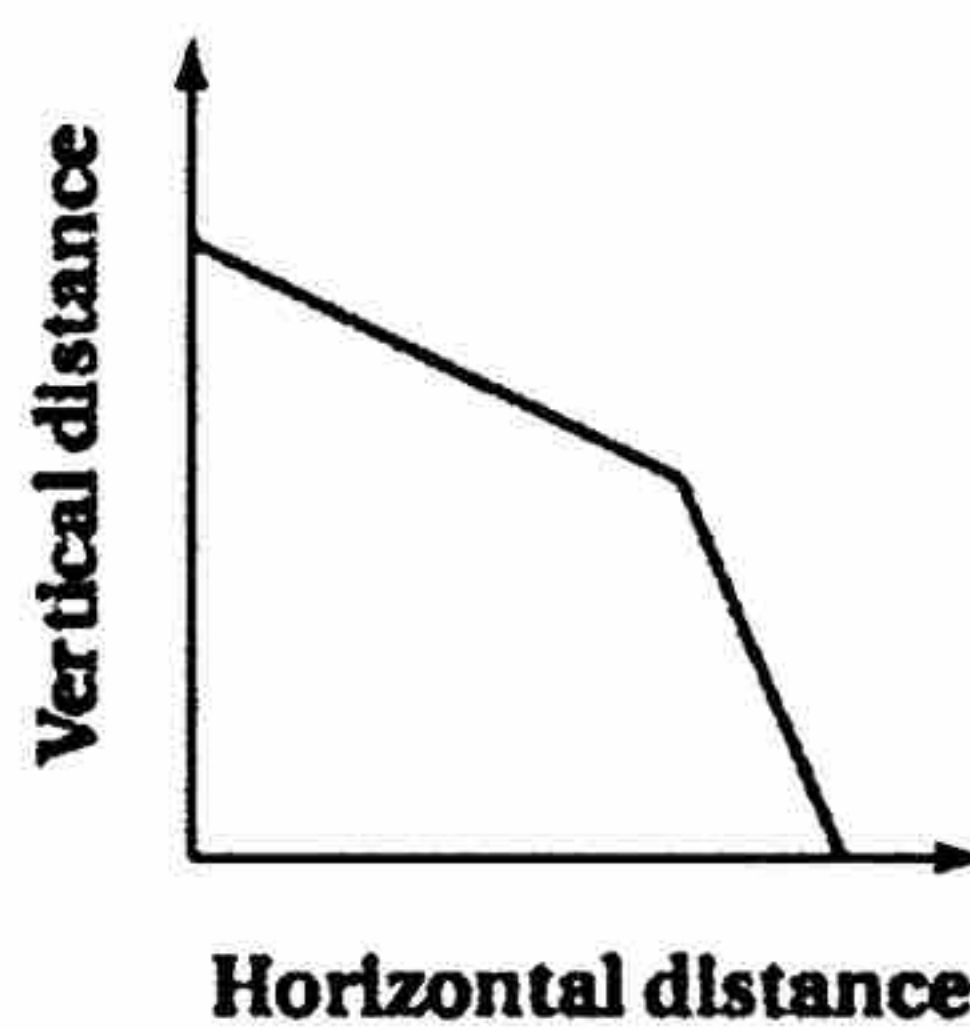
**6.5
Analyzing and
Sketching
Graphs**

Graphs can show the relationship between quantities without using specific numbers on the axes.



**Example 1
Analyzing
Graphs**



	<p>a. Describe the change in temperature in each city.</p> <p>b. Make three comparisons from the graphs.</p>
<p>On Your Own</p>	<p>1. The graphs show the paths of two birds diving to catch fish.</p> <p>a. Describe the path of each bird.</p> <p>b. Make three comparisons from the graphs.</p> <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;"> <p>Pelican</p>  </div> <div style="text-align: center;"> <p>Osprey</p>  </div> </div>
<p>Example 2 Sketching Graphs</p>	<p>Sketch a graph that represents each situation.</p> <p>a. A stopped subway train gains speed at a constant rate until it reaches its maximum speed. It travels at this speed for a while, and then slows down at a constant rate until coming to a stop at the next station.</p> <p>b. As television size increases, the price increases at an increasing rate.</p>
<p>On Your Own</p>	<p>Sketch a graph that represents the situation.</p> <p>2. A fully charged battery loses its charge at a constant rate until it has no charge left. You plug it in and recharge it fully. Then it loses its charge at a constant rate until it has no charge left.</p> <p>3. As the available quantity of a product increases, the price decreases at a decreasing rate.</p>

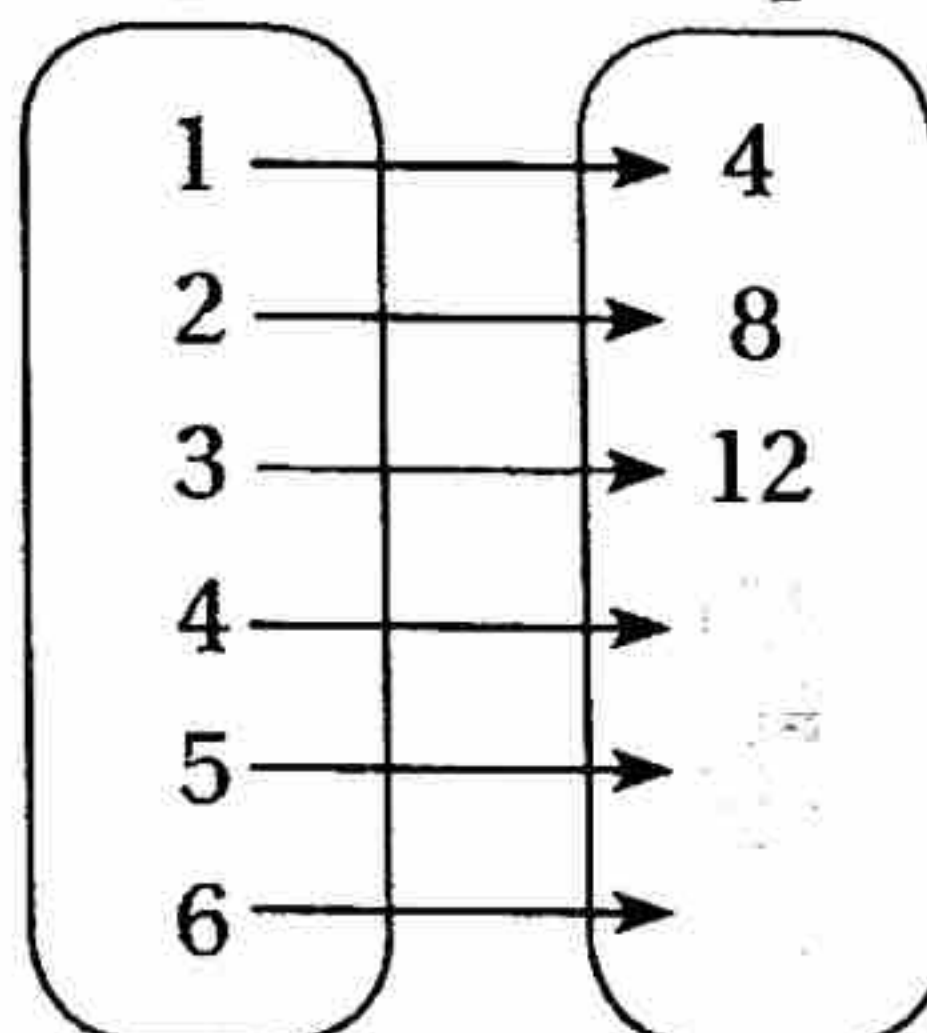
Vocabulary and Concept Check

- VOCABULARY** In an ordered pair, which number represents the input? the output?
- PRECISION** Describe how relations and functions are different.

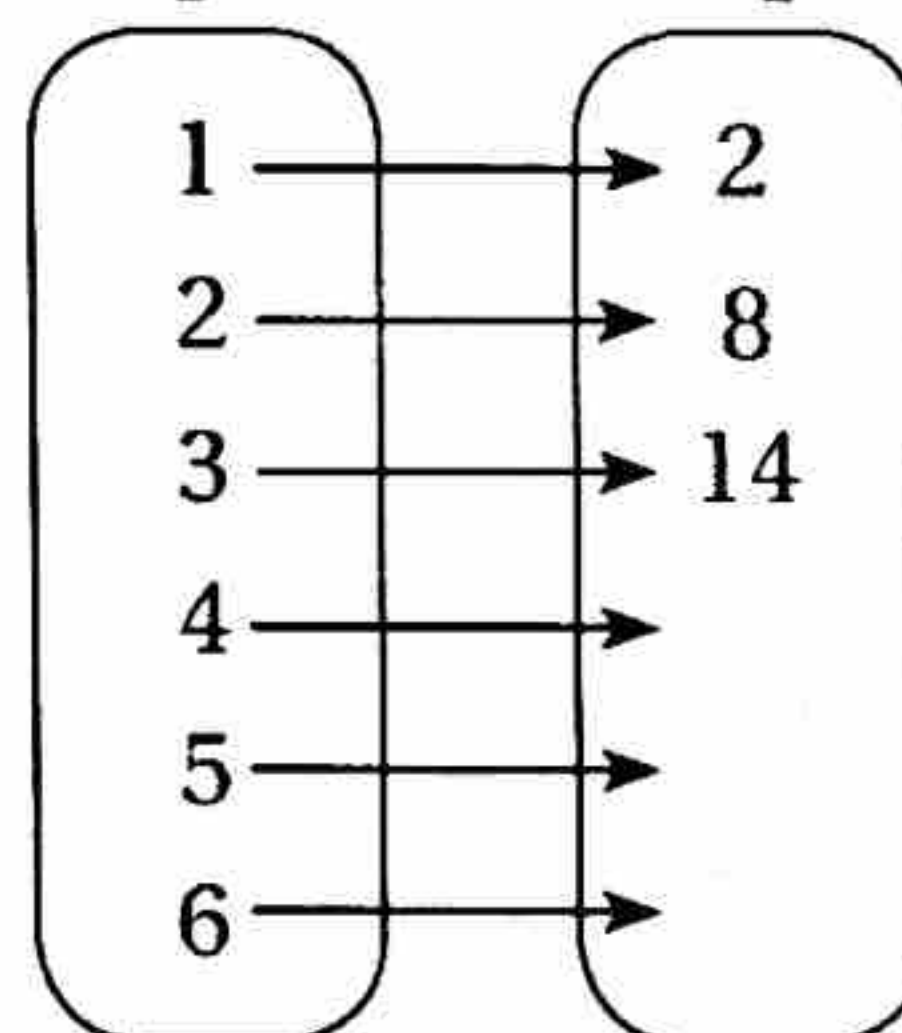
Practice and Problem Solving

Describe the pattern in the mapping diagram. Copy and complete the diagram.

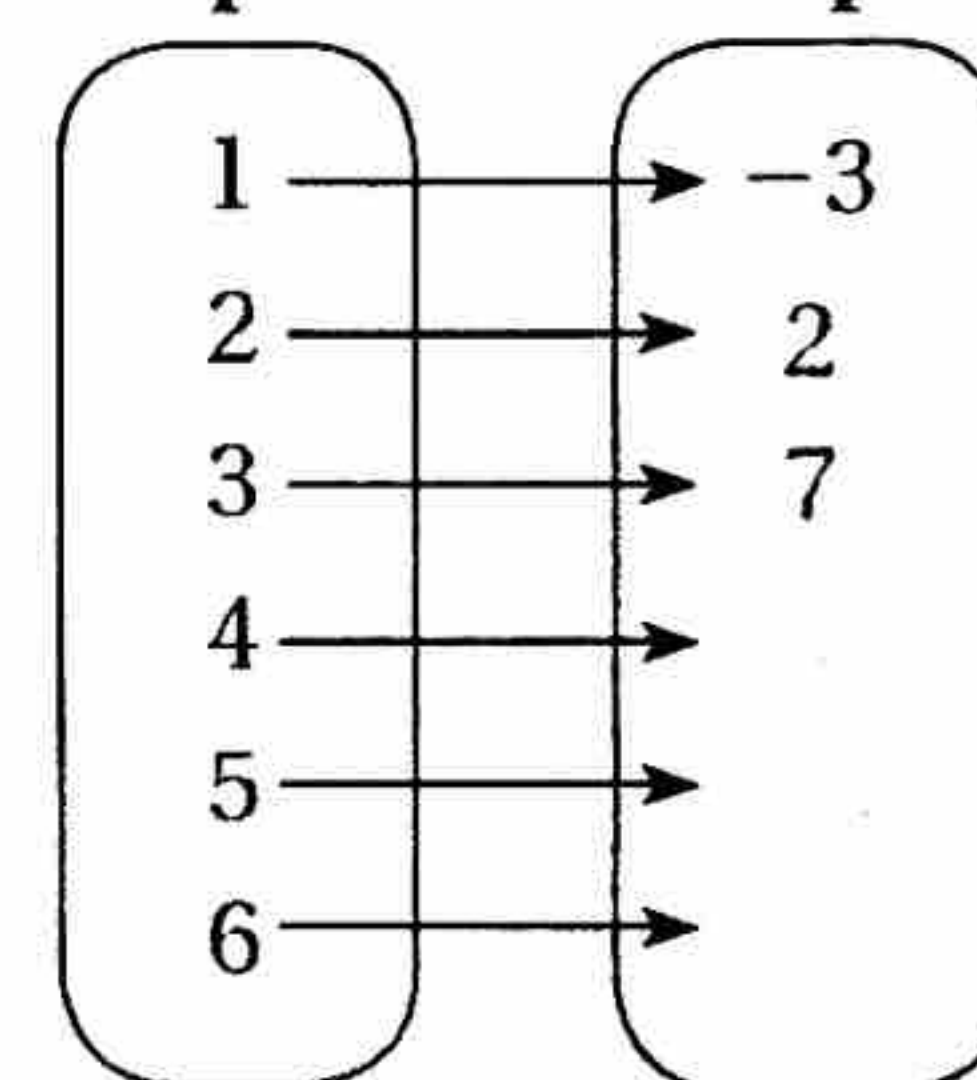
3. Input Output



4. Input Output

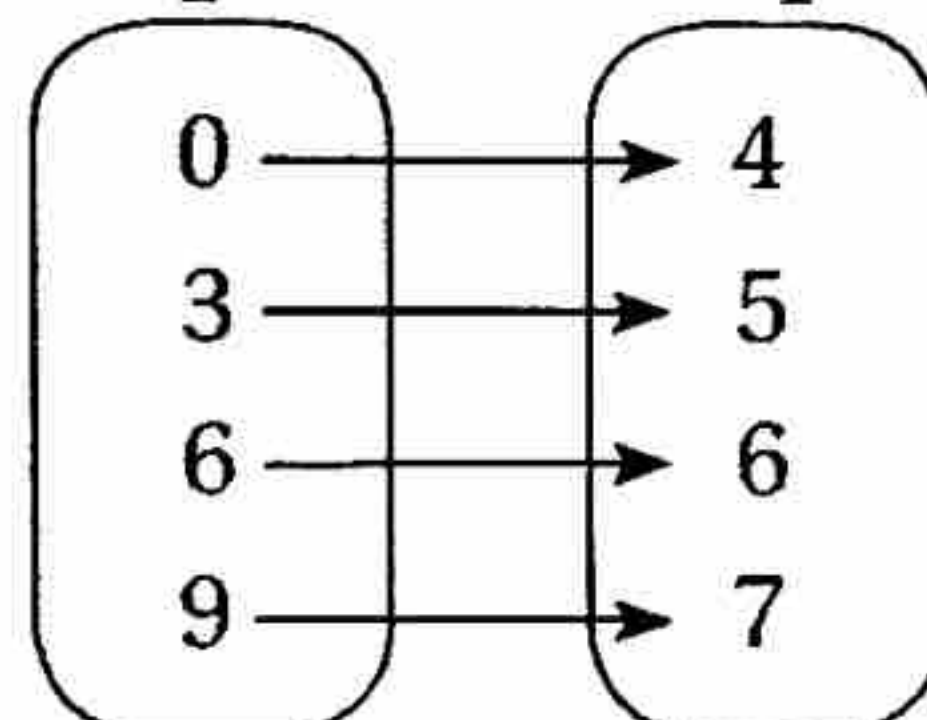


5. Input Output

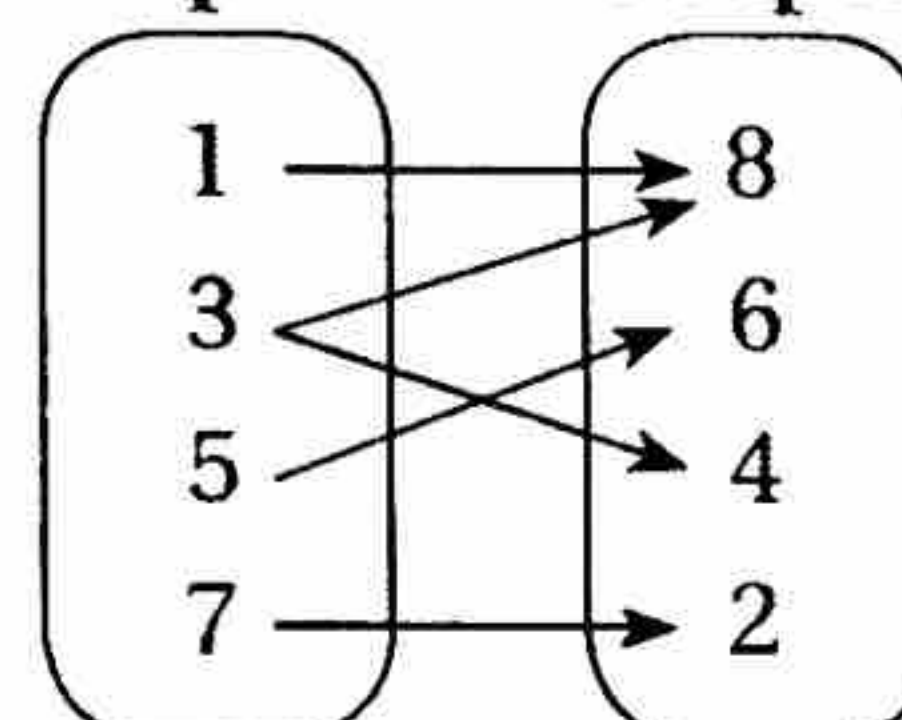


List the ordered pairs shown in the mapping diagram.

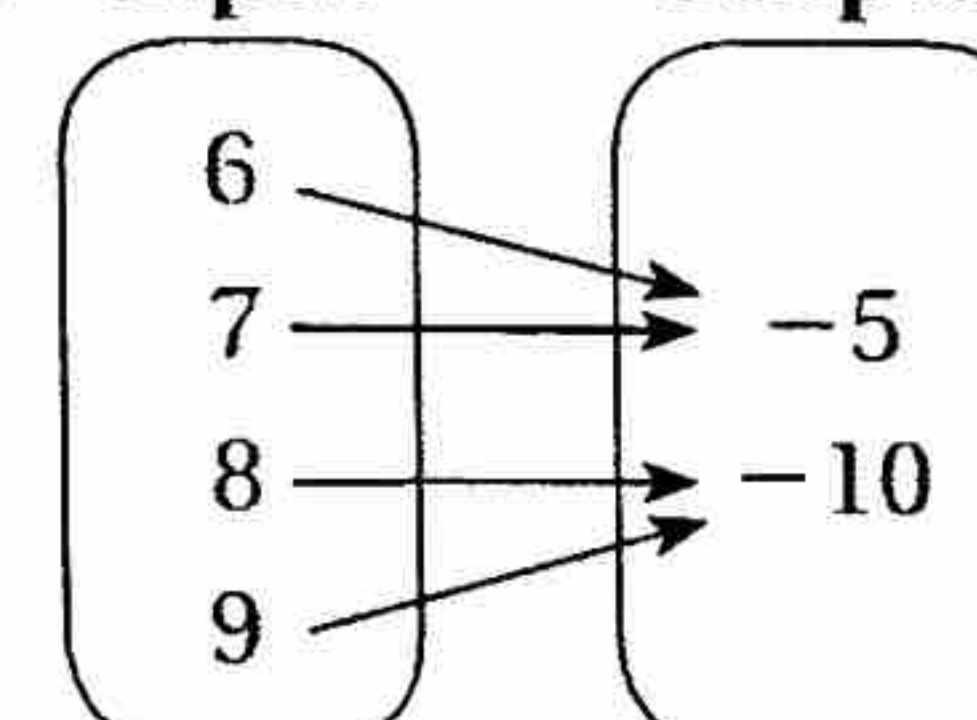
1 6. Input Output



7. Input Output

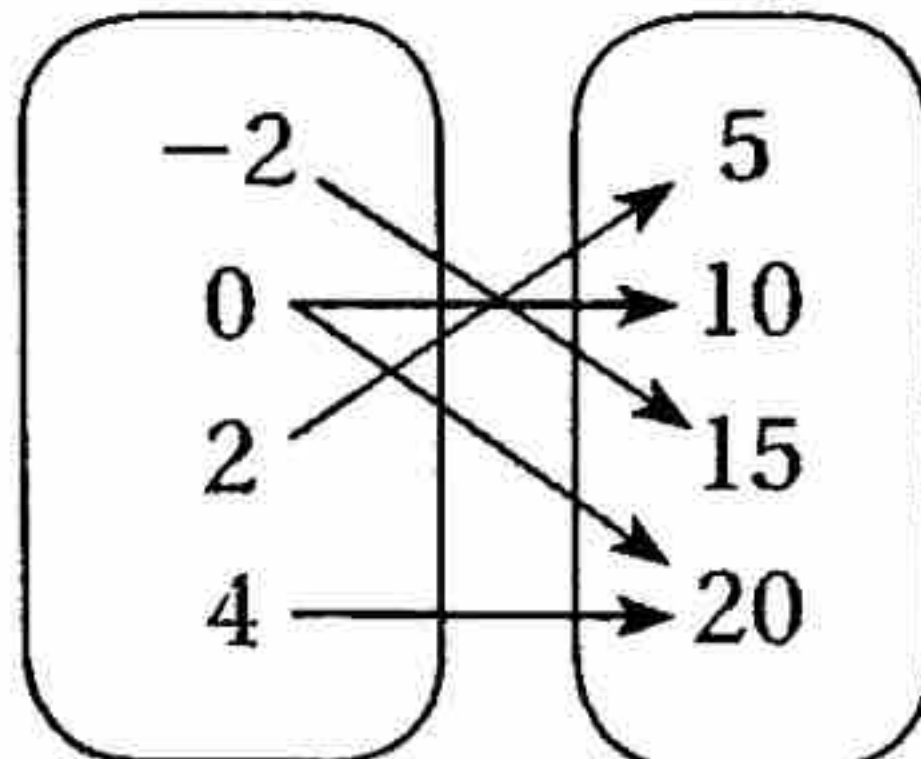


8. Input Output

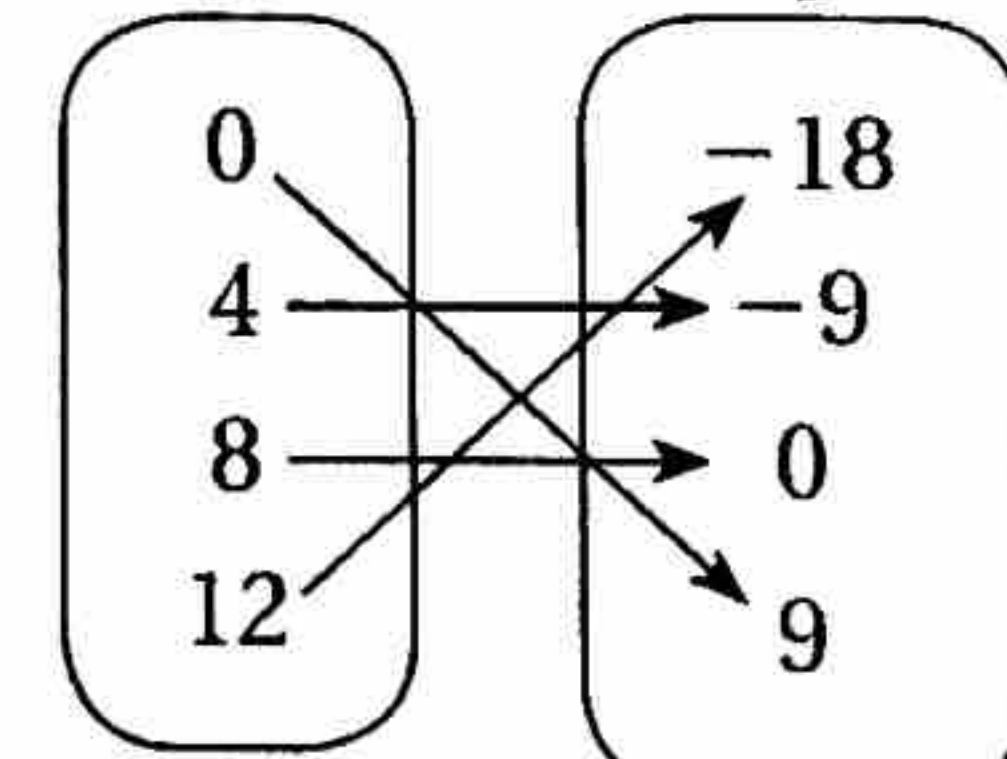


Determine whether the relation is a function.

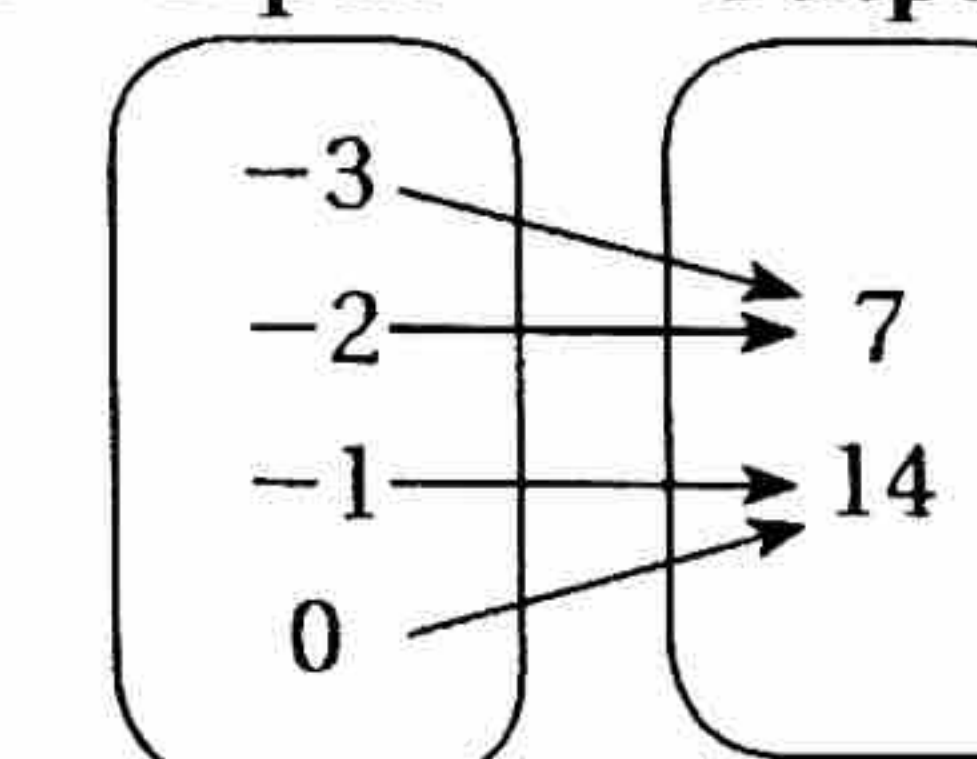
2 9. Input Output



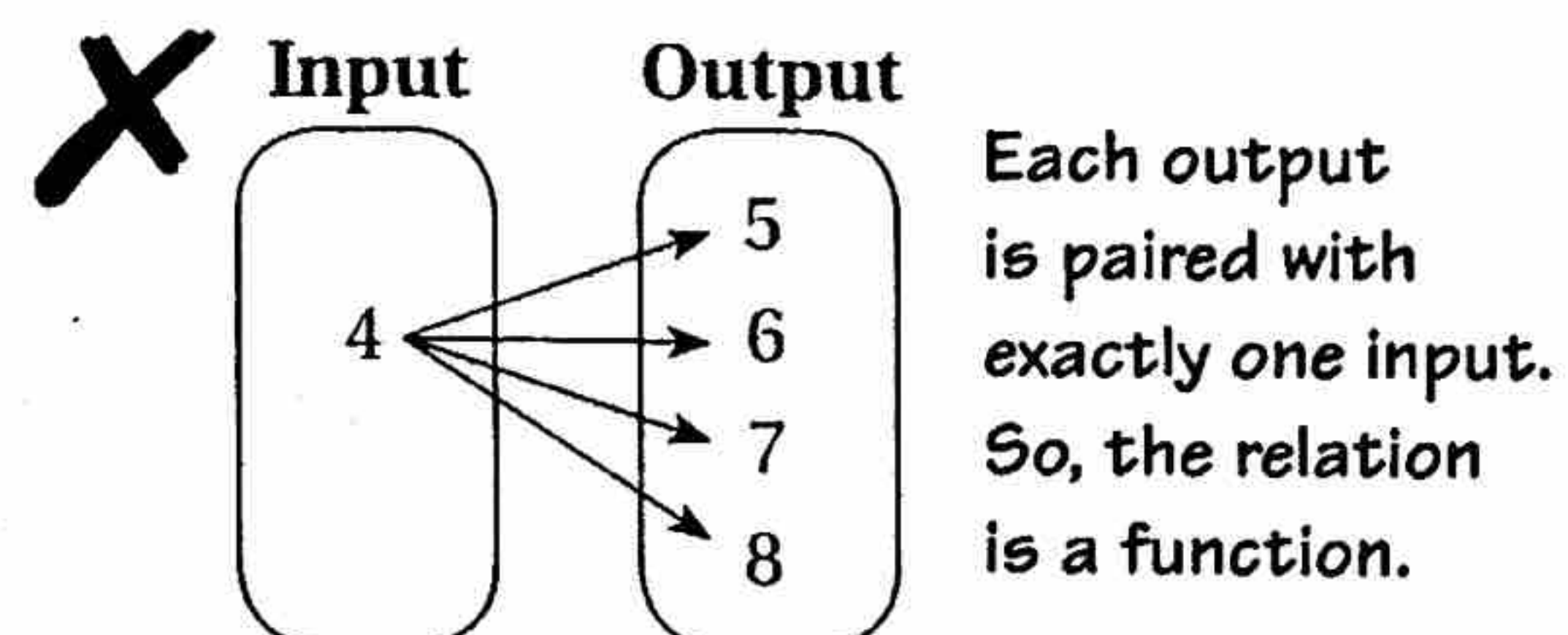
10. Input Output



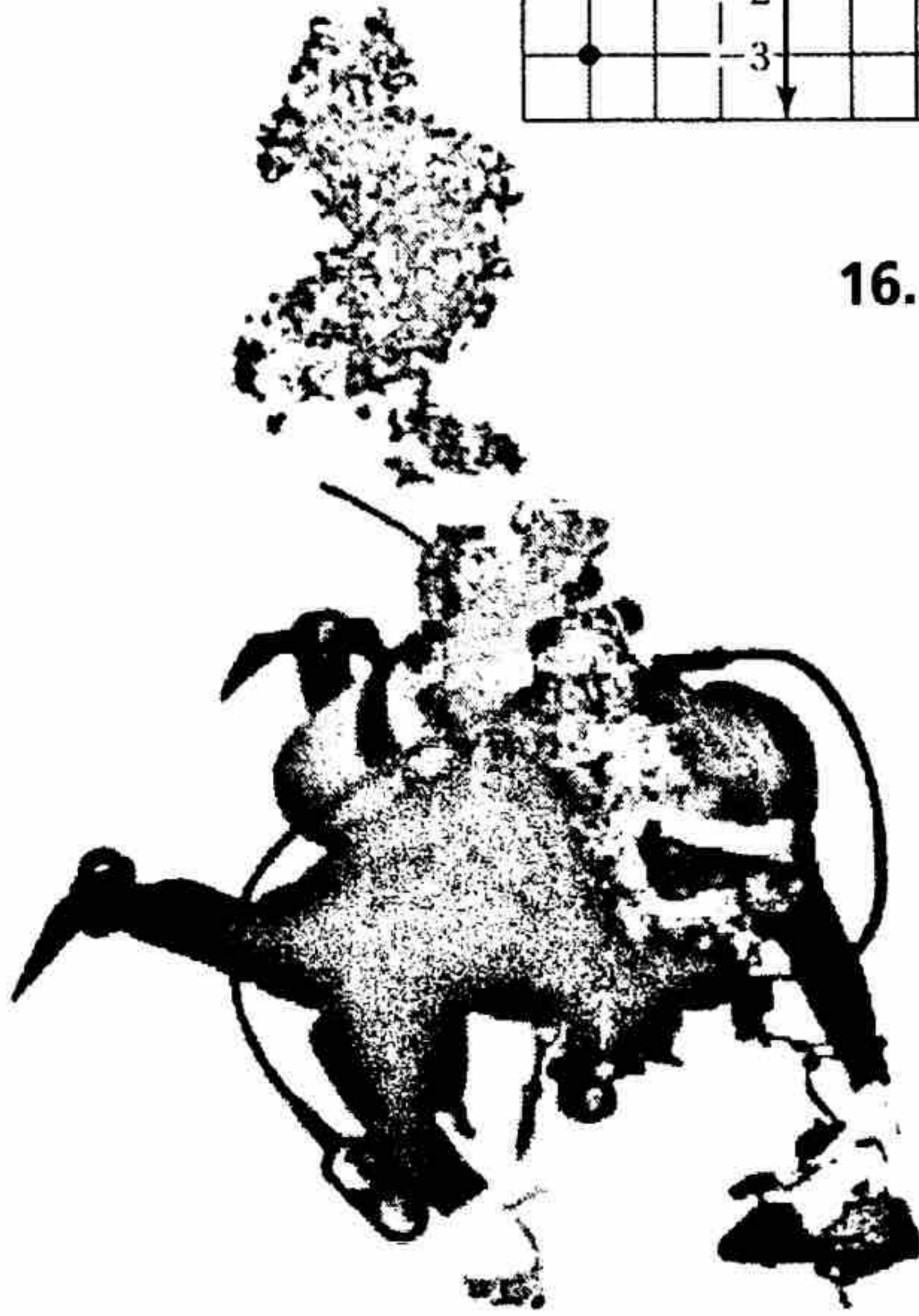
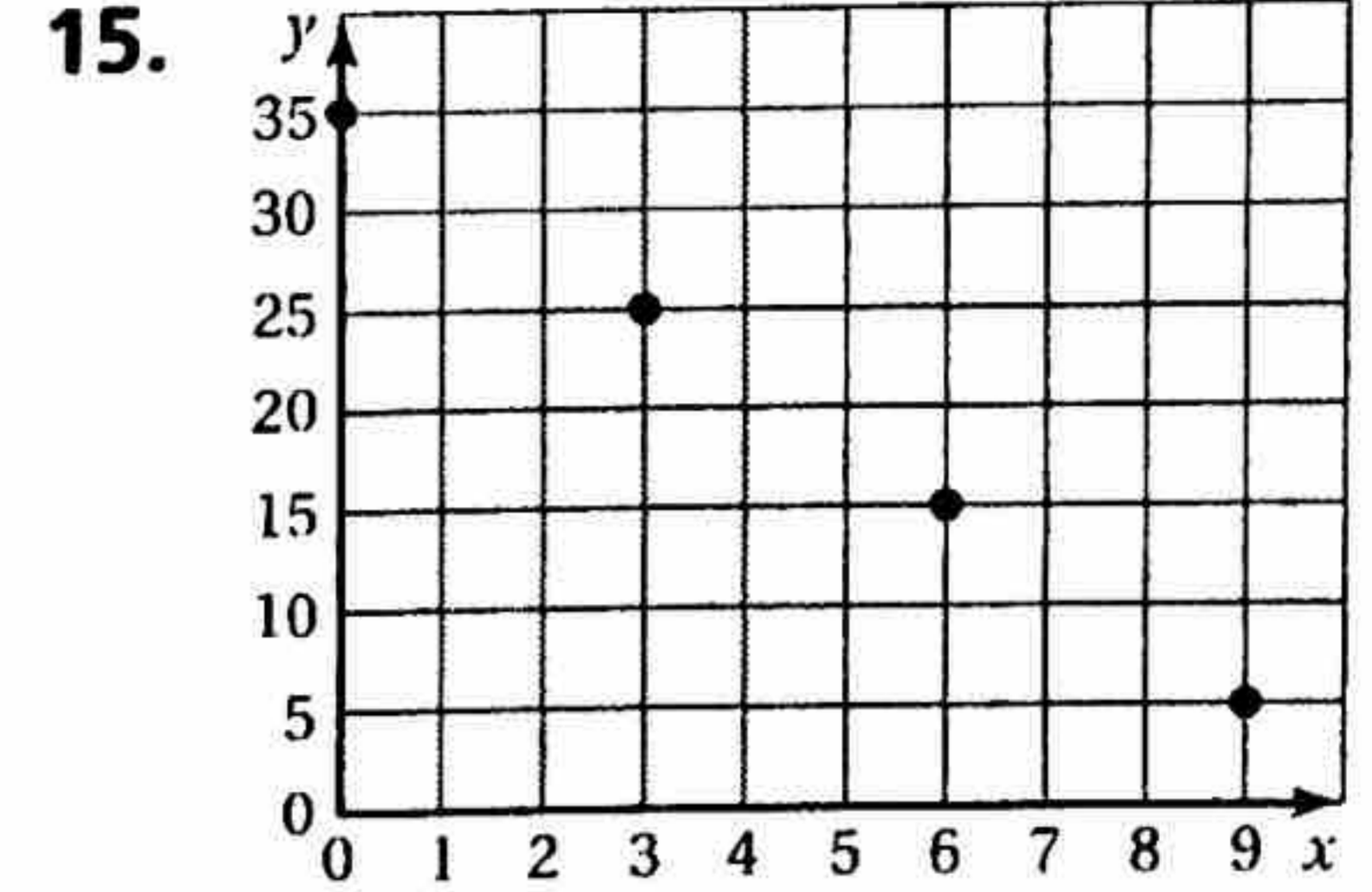
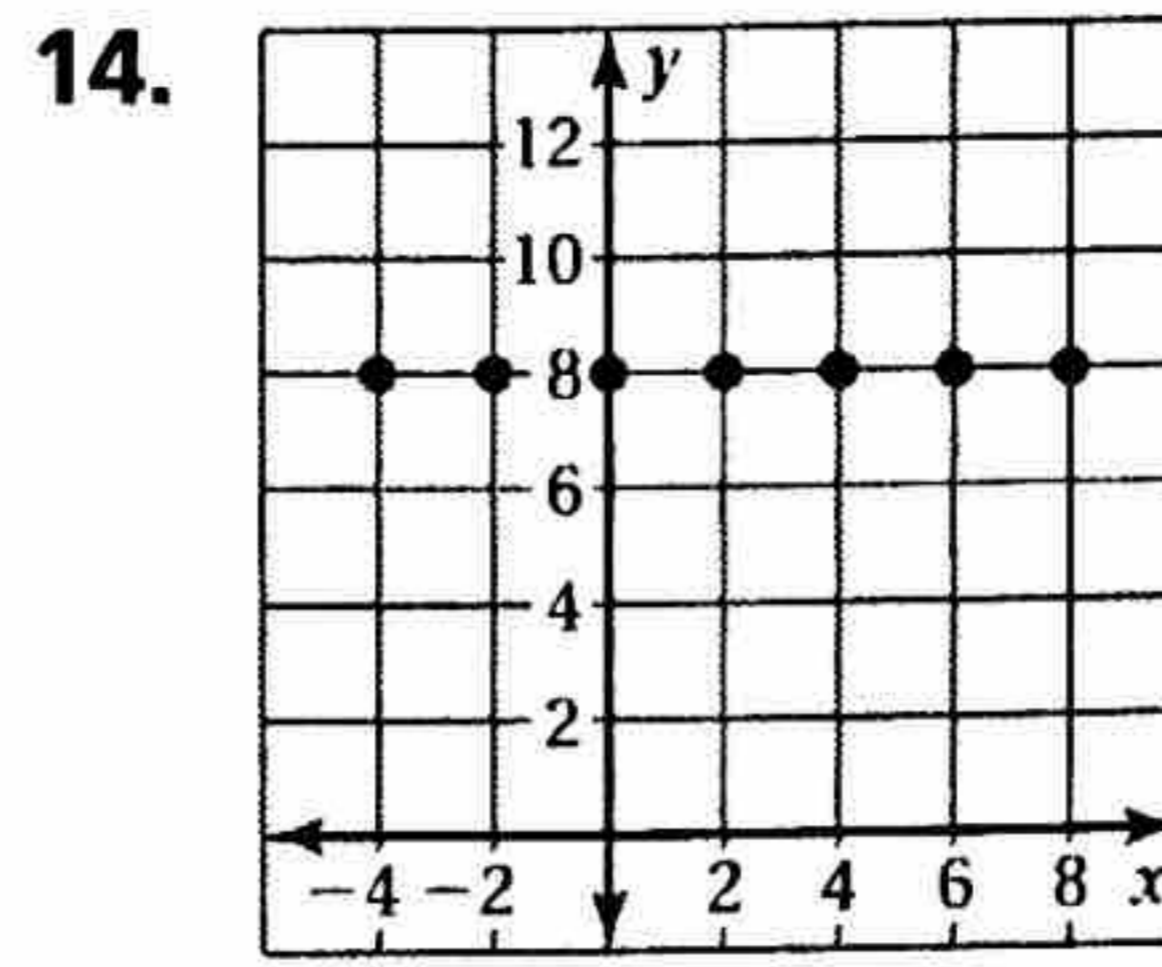
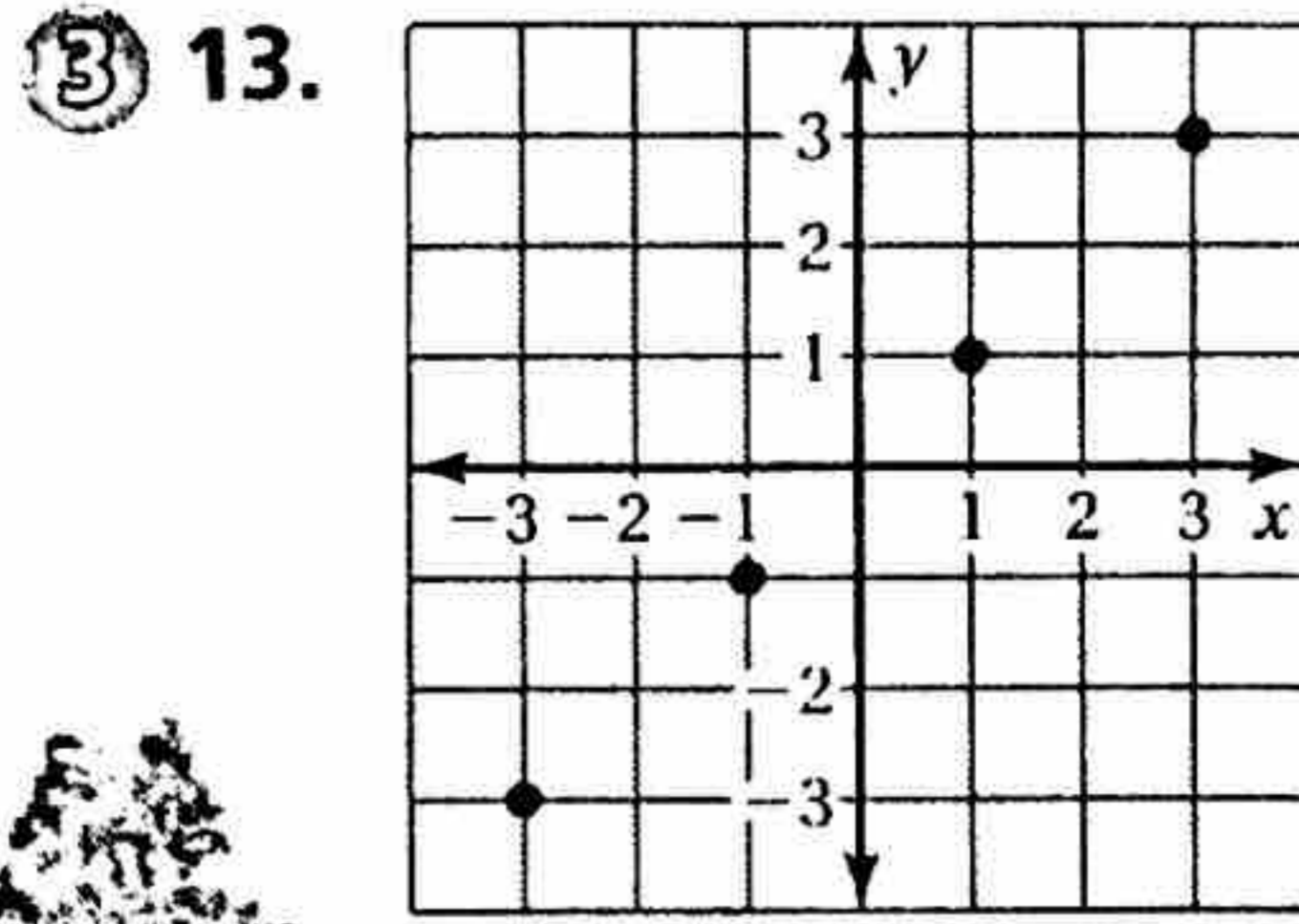
11. Input Output



12. **ERROR ANALYSIS** Describe and correct the error in determining whether the relation is a function.

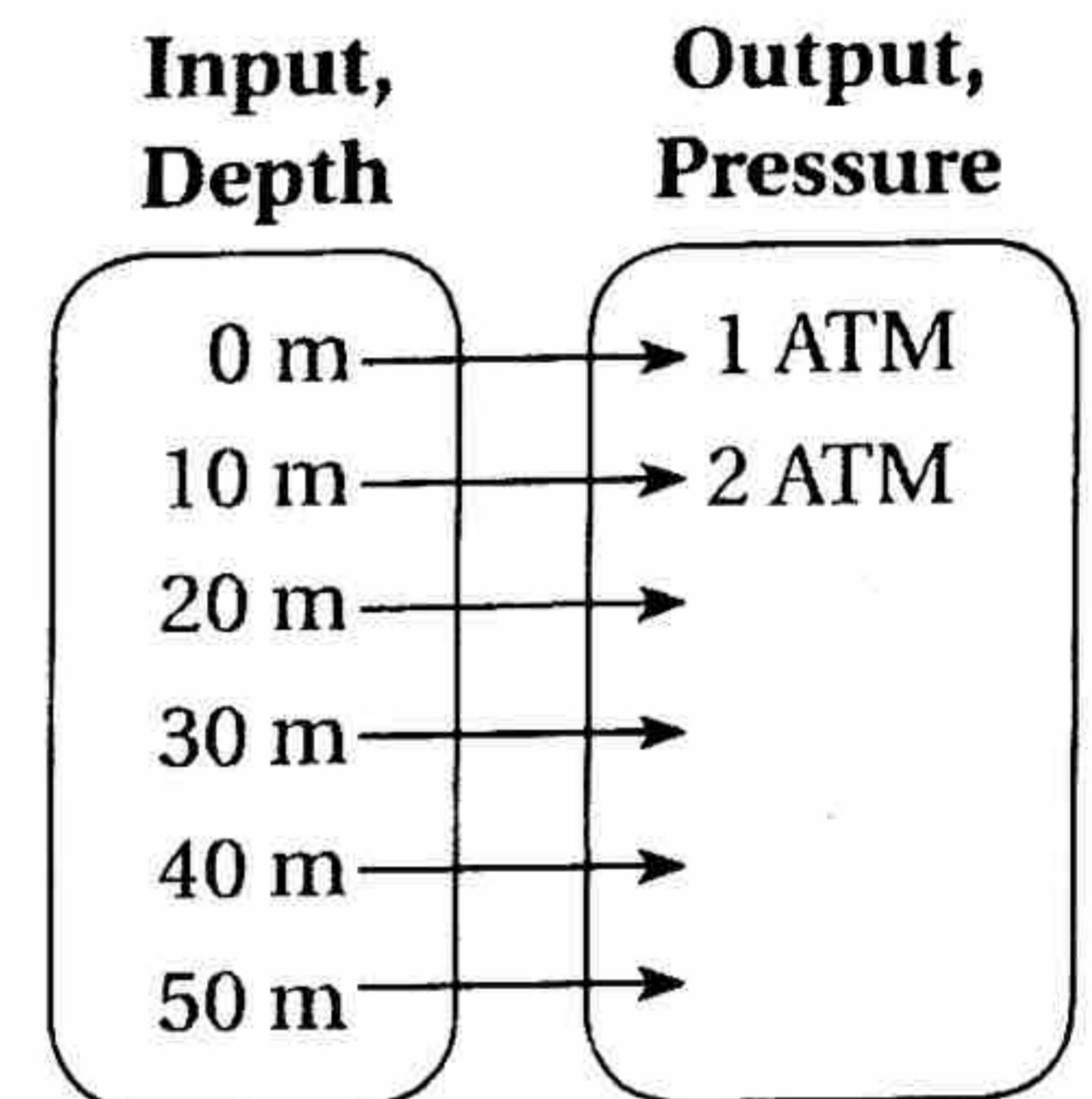


Draw a mapping diagram for the graph. Then describe the pattern of inputs and outputs.



16. **SCUBA DIVING** The normal pressure at sea level is one atmosphere of pressure (1 ATM). As you dive below sea level, the pressure increases by 1 ATM for each 10 meters of depth.

- Complete the mapping diagram.
- Is the relation a function? Explain.
- List the ordered pairs. Then plot the ordered pairs in a coordinate plane.
- Compare the mapping diagram and graph. Which do you prefer? Why?
- RESEARCH** What are common depths for people who are just learning to scuba dive? What are common depths for experienced scuba divers?



17. **MOVIES** A store sells previously viewed movies. The table shows the cost of buying 1, 2, 3, or 4 movies.

- Use the table to draw a mapping diagram.
- Is the relation a function? Explain.
- Describe the pattern. How does the cost per movie change as you buy more movies?

Movies	Cost
1	\$10
2	\$18
3	\$24
4	\$28

18. **Repeated Reasoning** The table shows the outputs for several inputs. Use two methods to find the output for an input of 200.

Input, x	0	1	2	3	4
Output, y	25	30	35	40	45



Fair Game Review

what you learned in previous grades & lessons

The coordinates of a point and its image are given. Is the reflection in the x -axis or y -axis? (Section 2.3)

19. $(3, -3) \rightarrow (-3, -3)$ 20. $(-5, 1) \rightarrow (-5, -1)$ 21. $(-2, -4) \rightarrow (-2, 4)$

22. **MULTIPLE CHOICE** Which word best describes two figures that have the same size and the same shape? (Section 2.1)

- (A) congruent (B) dilation (C) parallel (D) similar

6.2 Exercises

Vocabulary and Concept Check

- VOCABULARY** Identify the input variable and the output variable for the function rule $y = 2x + 5$.
- WRITING** Describe five ways to represent a function.
- DIFFERENT WORDS, SAME QUESTION** Which is different? Find “both” answers.

What output is 4 more than twice the input 3?

What output is twice the sum of the input 3 and 4?

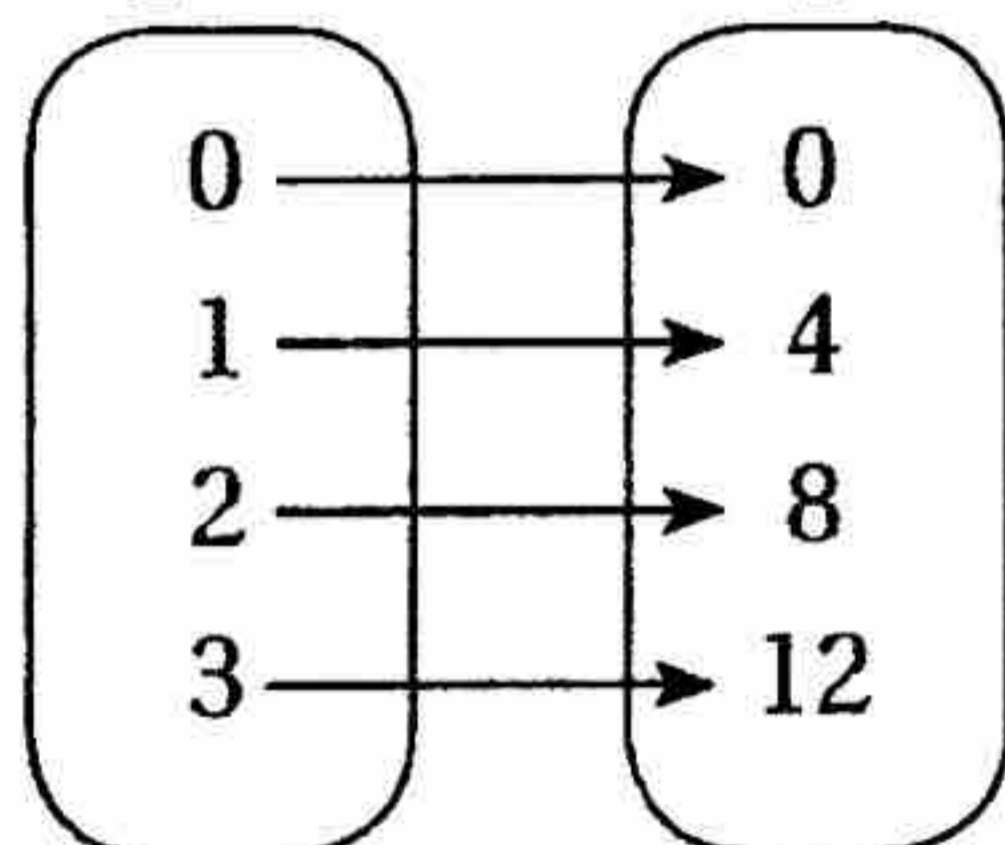
What output is the sum of 2 times the input 3 and 4?

What output is 4 increased by twice the input 3?

Practice and Problem Solving

Write an equation that describes the function.

4. Input, x Output, y



5.

Input, x	Output, y
1	8
2	9
3	10
4	11

6.

Input, x	Output, y
1	0
3	-2
5	-4
7	-6

Write a function rule for the statement.

- The output is half of the input.
- The output is eleven more than the input.
- The output is three less than the input.
- The output is the cube of the input.
- The output is six times the input.
- The output is one more than twice the input.

Find the value of y for the given value of x .

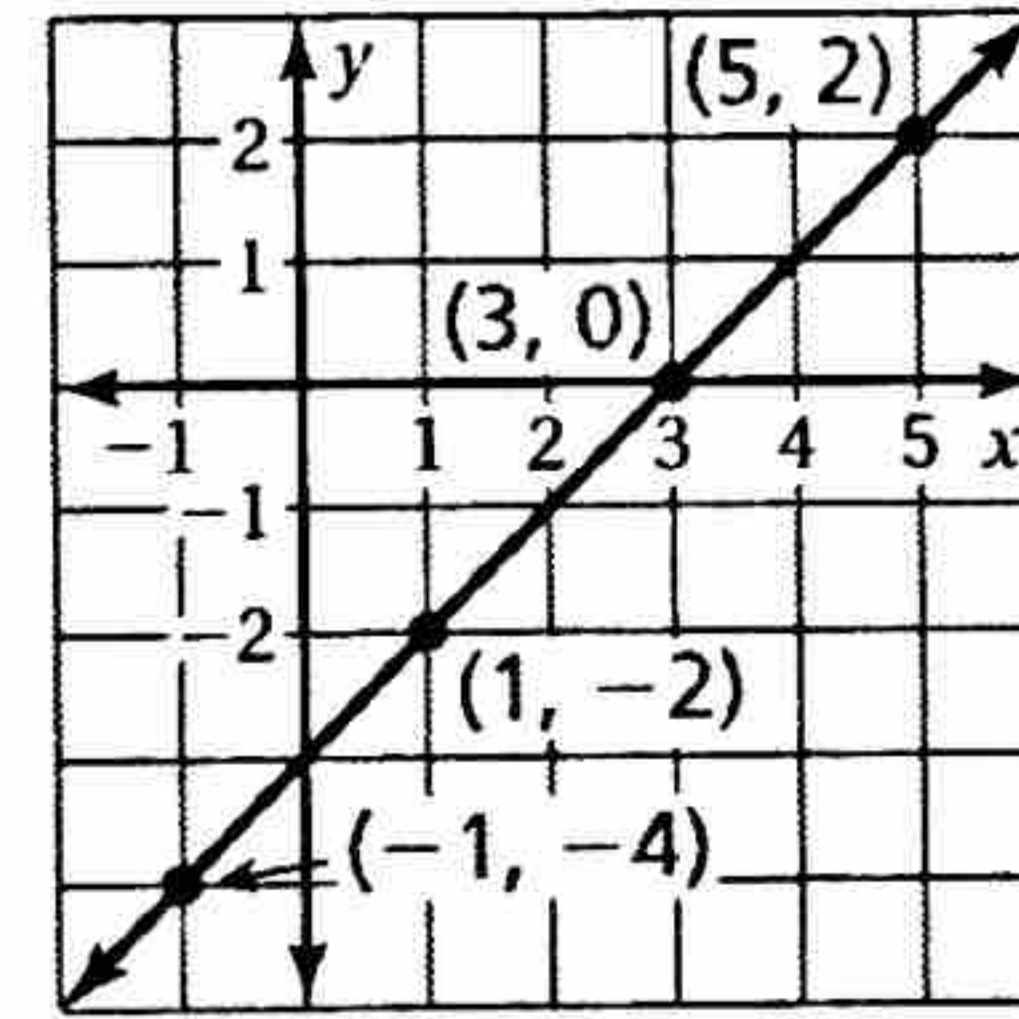
- $y = x + 5$; $x = 3$
- $y = 7x$; $x = -5$
- $y = 1 - 2x$; $x = 9$
- $y = 3x + 2$; $x = 0.5$
- $y = 2x^3$; $x = 3$
- $y = \frac{x}{2} + 9$; $x = -12$

Graph the function.

- $y = x + 4$
- $y = 2x$
- $y = -5x + 3$
- $y = \frac{x}{4}$
- $y = \frac{3}{2}x + 1$
- $y = 1 + 0.5x$

25. **ERROR ANALYSIS** Describe and correct the error in graphing the function represented by the input-output table.

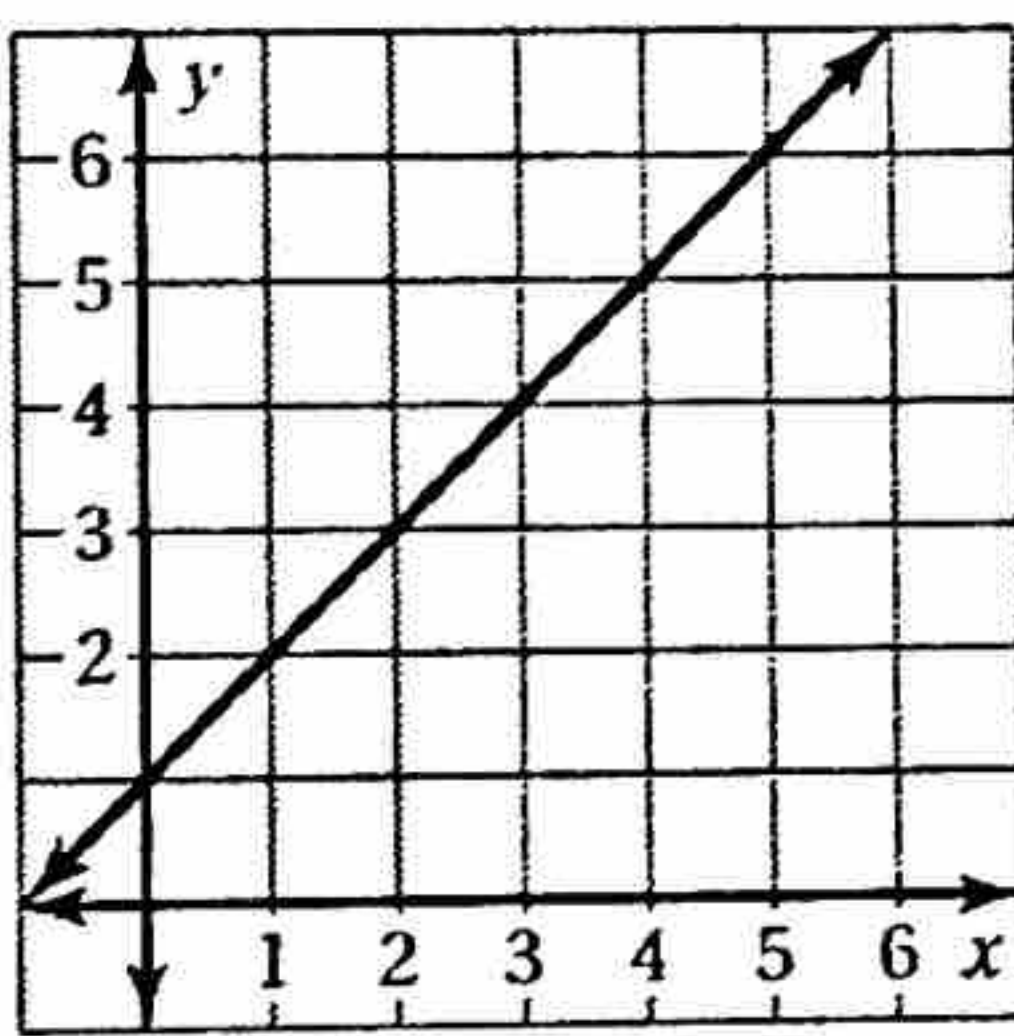
Input, x	-4	-2	0	2
Output, y	-1	1	3	5



26. **DOLPHIN** A dolphin eats 30 pounds of fish per day.
- Write and graph a function that relates the number of pounds p of fish that a dolphin eats in d days.
 - How many pounds of fish does a dolphin eat in 30 days?

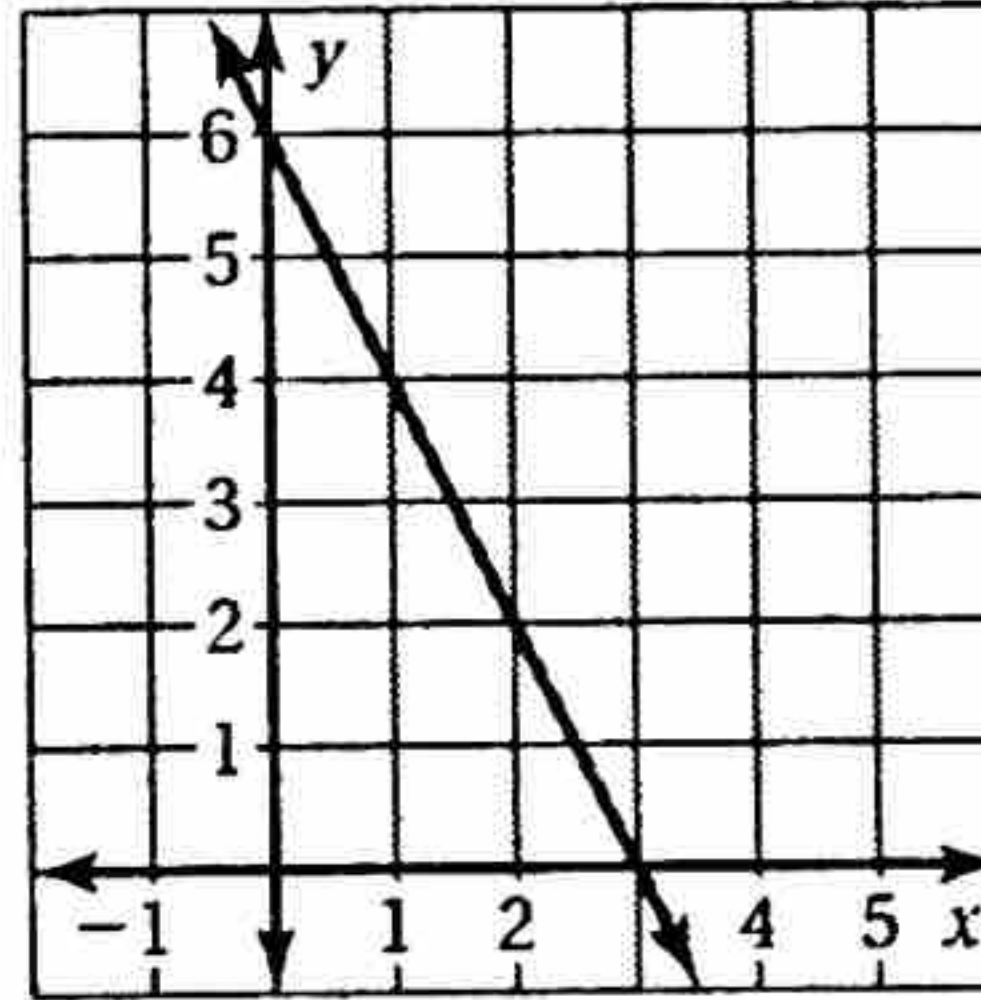
Match the graph with the function it represents.

27.



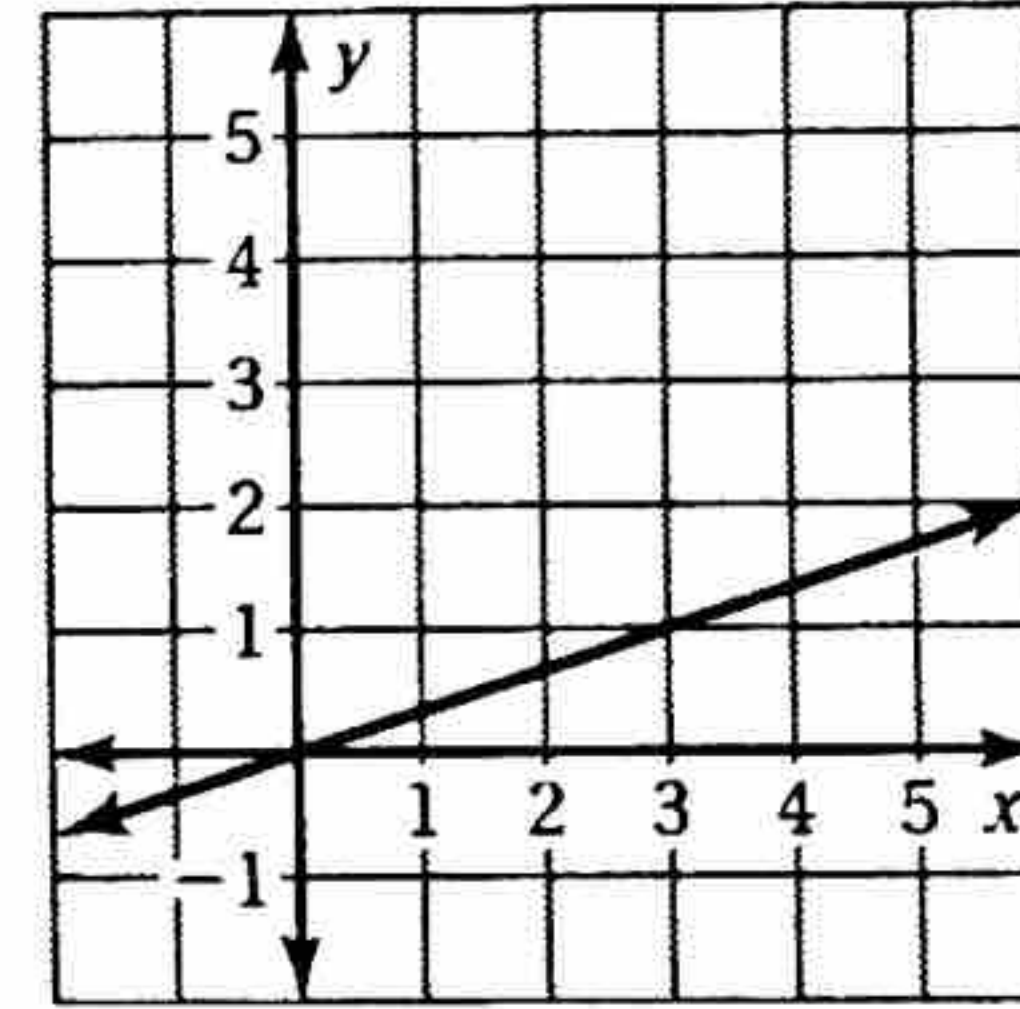
A. $y = \frac{x}{3}$

28.



B. $y = x + 1$

29.



C. $y = -2x + 6$

Find the value of x for the given value of y .

30. $y = 5x - 7; y = -22$

31. $y = 9 - 7x; y = 37$

32. $y = \frac{x}{4} - 7; y = 2$

33. **BRACELETS** You decide to make and sell bracelets. The cost of your materials is \$84. You charge \$3.50 for each bracelet.

- Write a function that represents the profit P for selling b bracelets.
- Which variable is independent? dependent? Explain.
- You will *break even* when the cost of your materials equals your income. How many bracelets must you sell to break even?



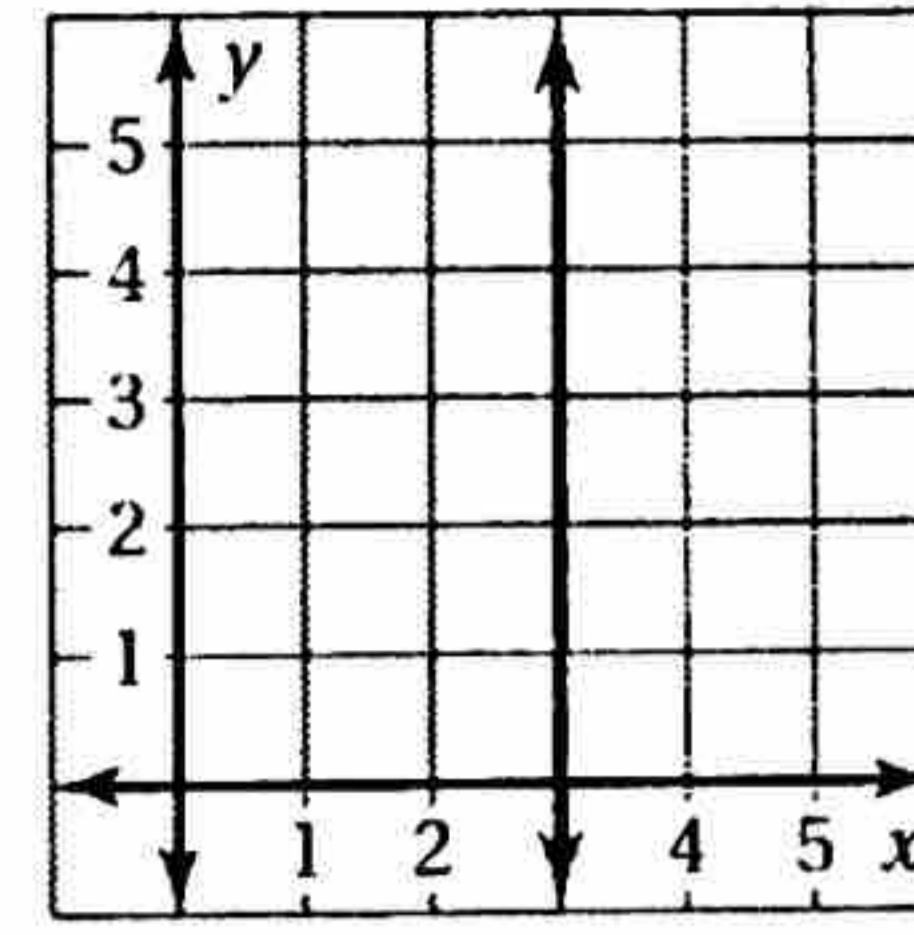
34. **SALE** A furniture store is having a sale where everything is 40% off.

- Write a function that represents the amount of discount d on an item with a regular price p .
- Graph the function using the inputs 100, 200, 300, 400, and 500 for p .
- You buy a bookshelf that has a regular price of \$85. What is the sale price of the bookshelf?

6.3 Exercises

Vocabulary and Concept Check

- STRUCTURE** Is $y = mx + b$ a linear function when $b = 0$? Explain.
- WRITING** Explain why the vertical line does not represent a linear function.



Practice and Problem Solving

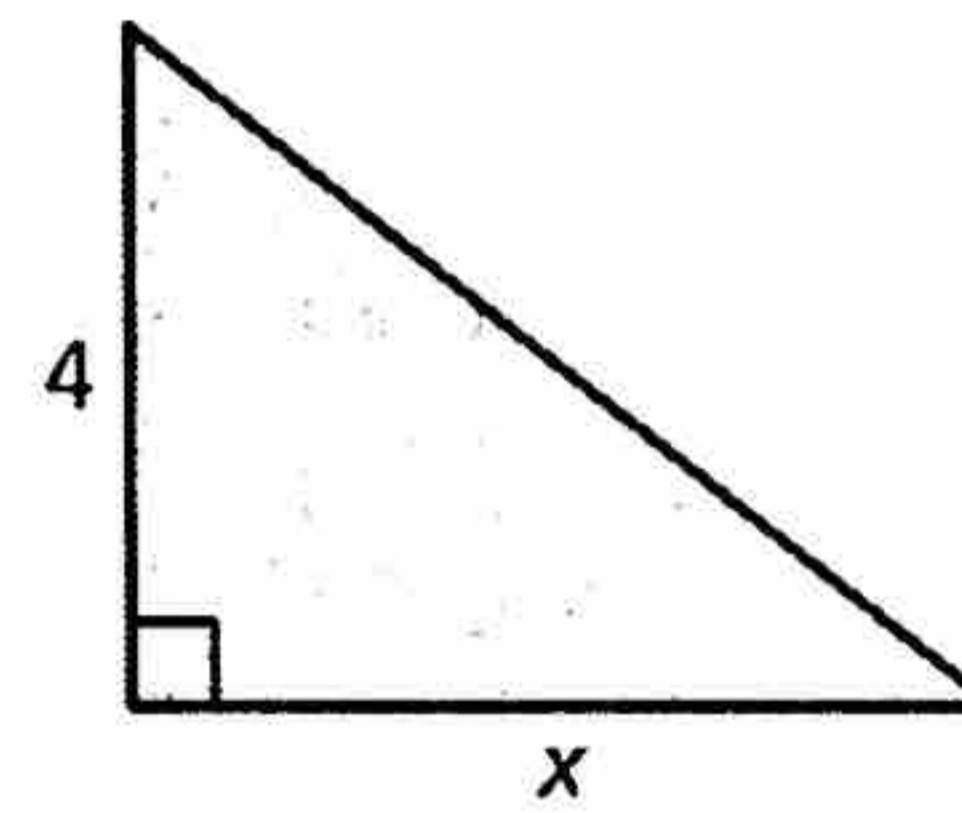
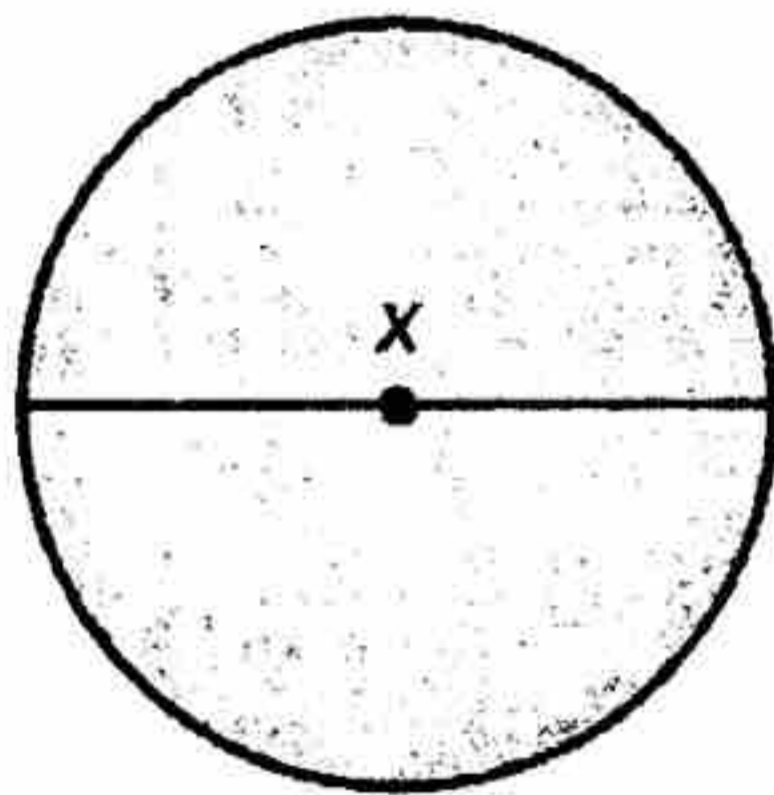
The table shows a familiar linear pattern from geometry. Write a function that relates y to x . What do the variables x and y represent? Graph the function.

3.

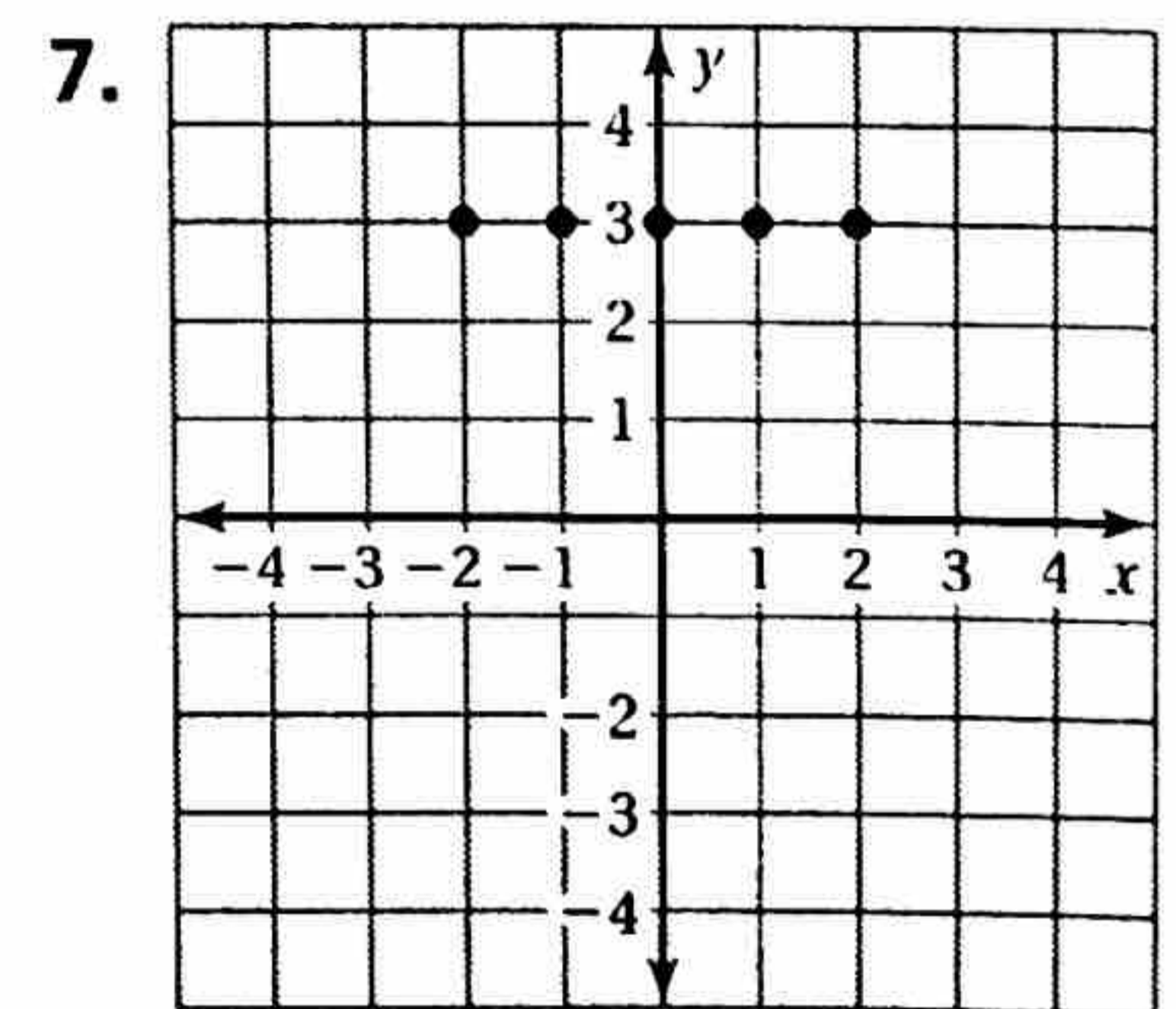
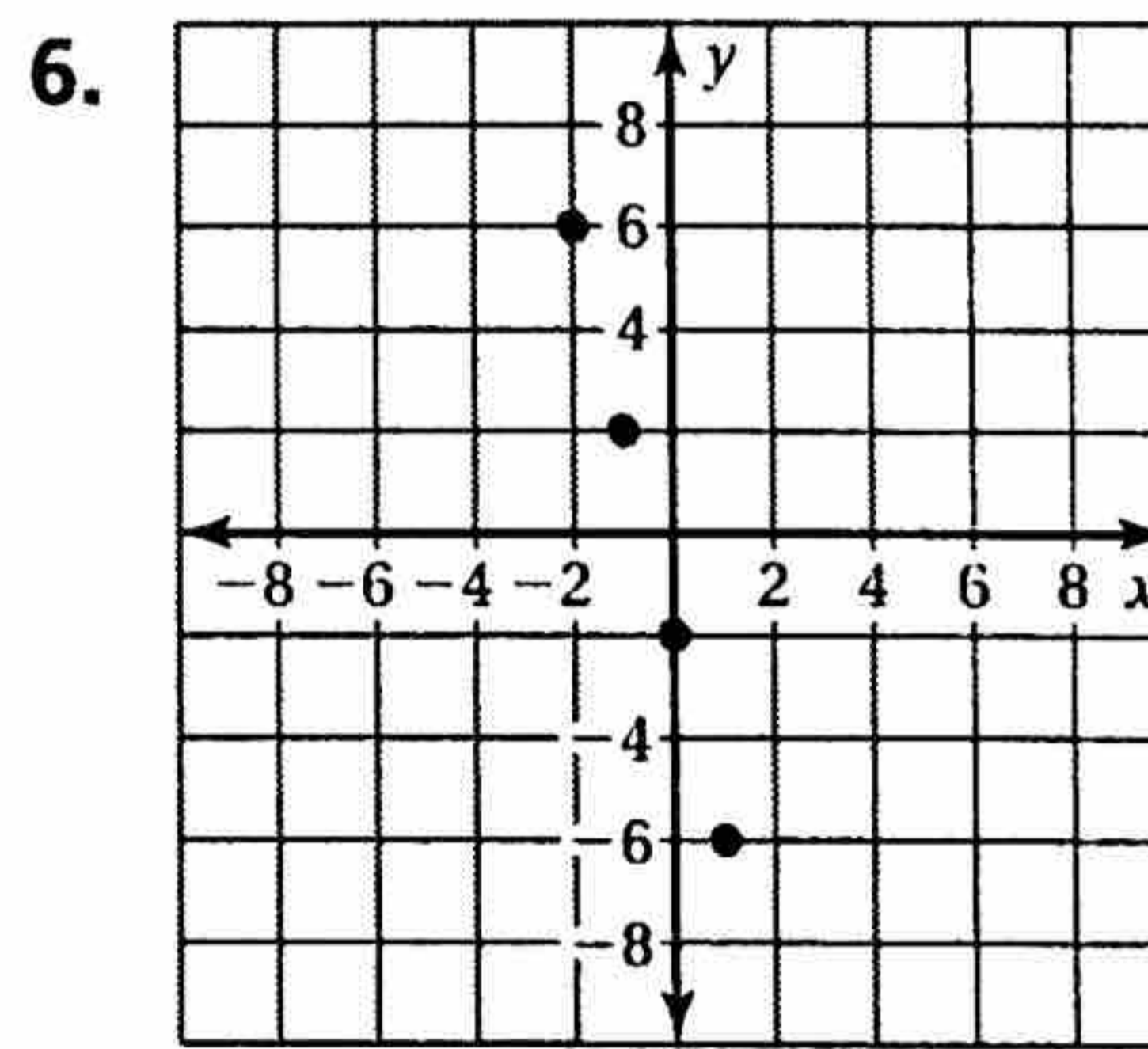
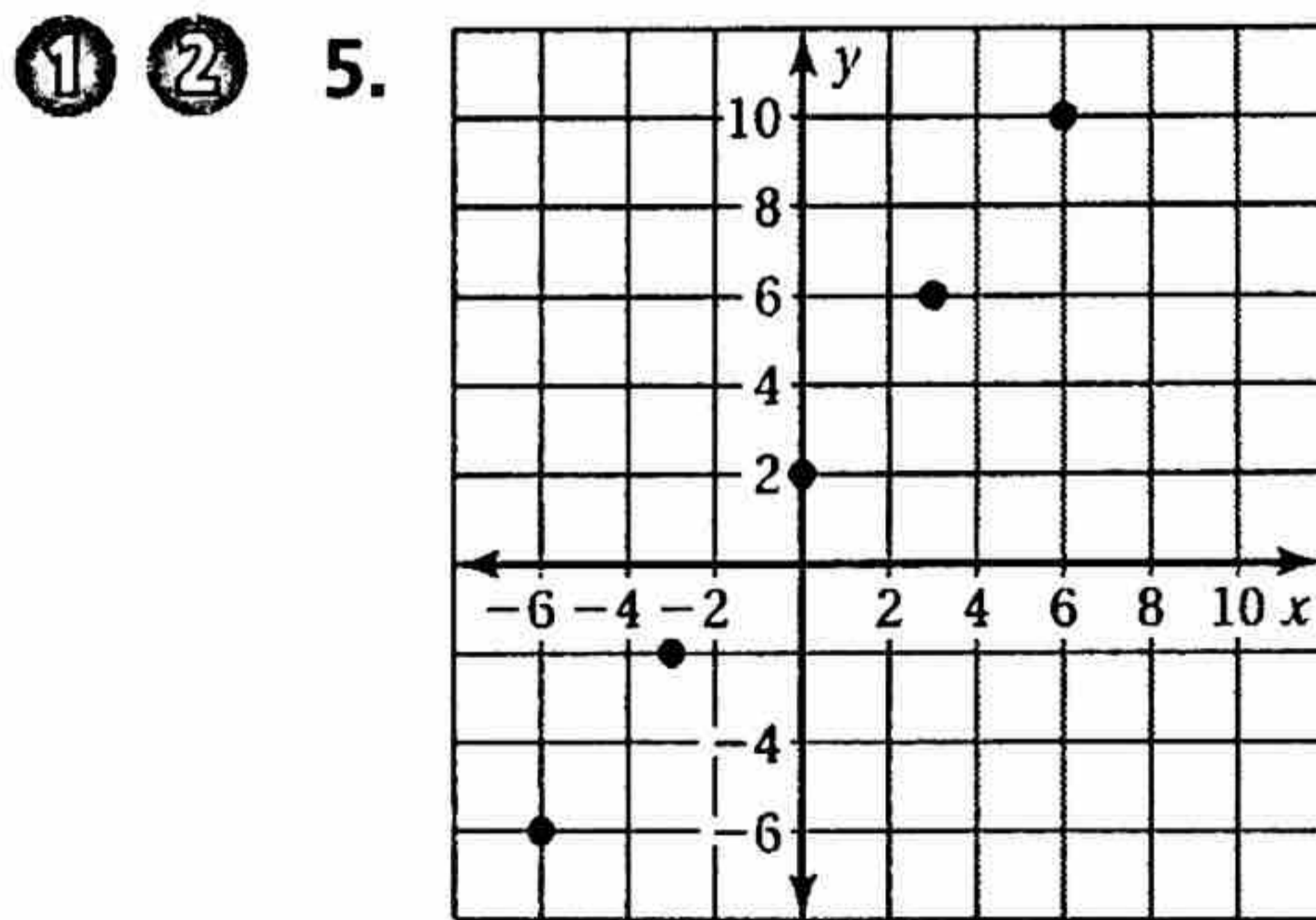
x	1	2	3	4	5
y	π	2π	3π	4π	5π

4.

x	1	2	3	4	5
y	2	4	6	8	10



Use the graph or table to write a linear function that relates y to x .



8.

x	-2	-1	0	1
y	-4	-2	0	2

9.

x	-8	-4	0	4
y	2	1	0	-1

10.

x	-3	0	3	6
y	3	5	7	9

11. **MOVIES** The table shows the cost y (in dollars) of renting x movies.

- Which variable is independent? dependent?
- Write a linear function that relates y to x . Interpret the slope.
- Graph the linear function.
- How much does it cost to rent three movies?

Number of Movies, x	0	1	2	4
Cost, y	0	3	6	12



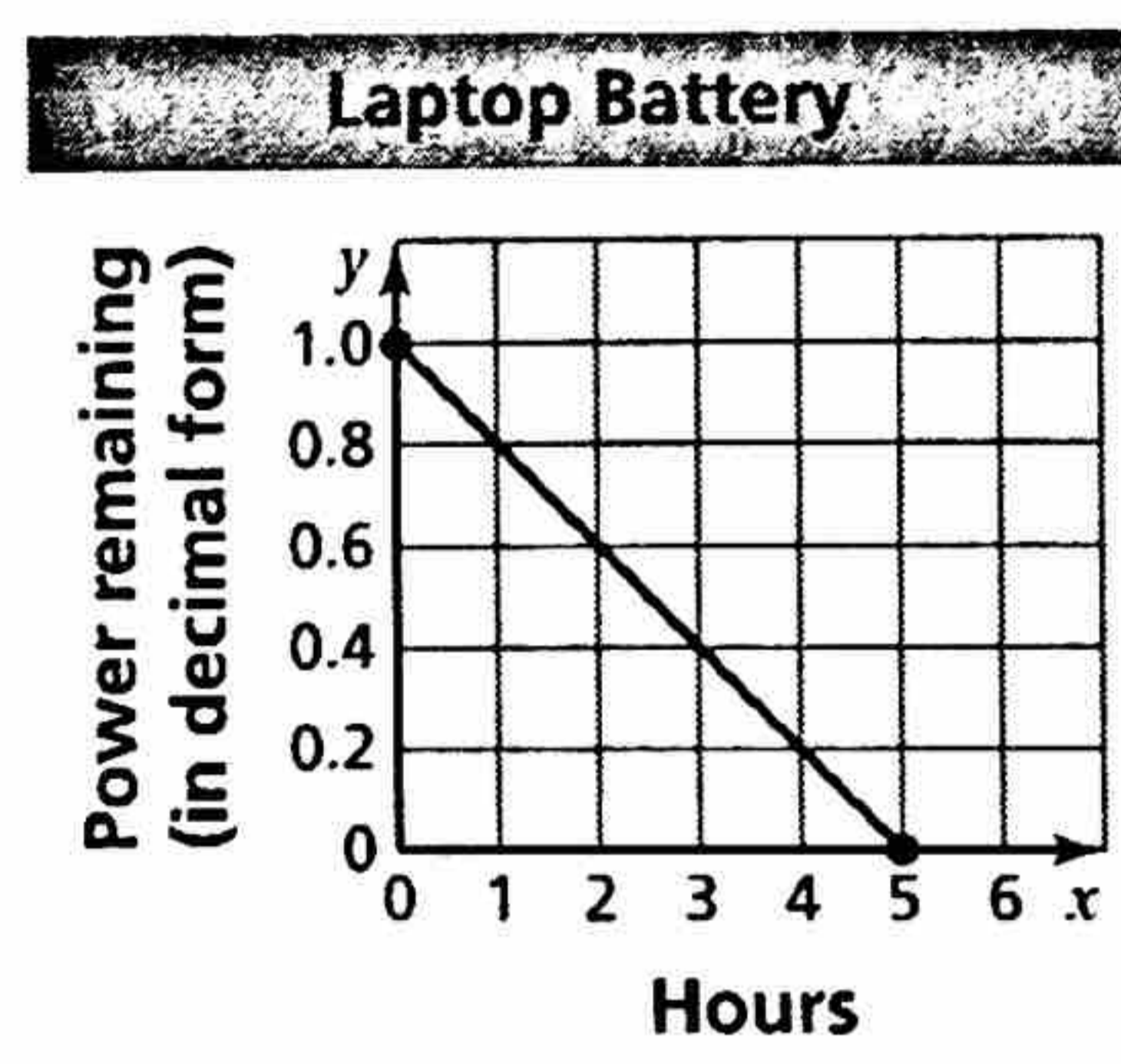
12. **BIKE JUMPS** A *bunny hop* is a bike trick in which the rider brings both tires off the ground without using a ramp. The table shows the height y (in inches) of a bunny hop on a bike that weighs x pounds.

Weight (pounds), x	19	21	23
Height (inches), y	10.2	9.8	9.4

- Write a linear function that relates the height of a bunny hop to the weight of the bike.
- Graph the linear function.
- What is the height of a bunny hop on a bike that weighs 21.5 pounds?

13. **BATTERY** The graph shows the percent y (in decimal form) of battery power remaining x hours after you turn on a laptop computer.

- Write a linear function that relates y to x .
- Interpret the slope, the x -intercept, and the y -intercept.
- After how many hours is the battery power at 75%?



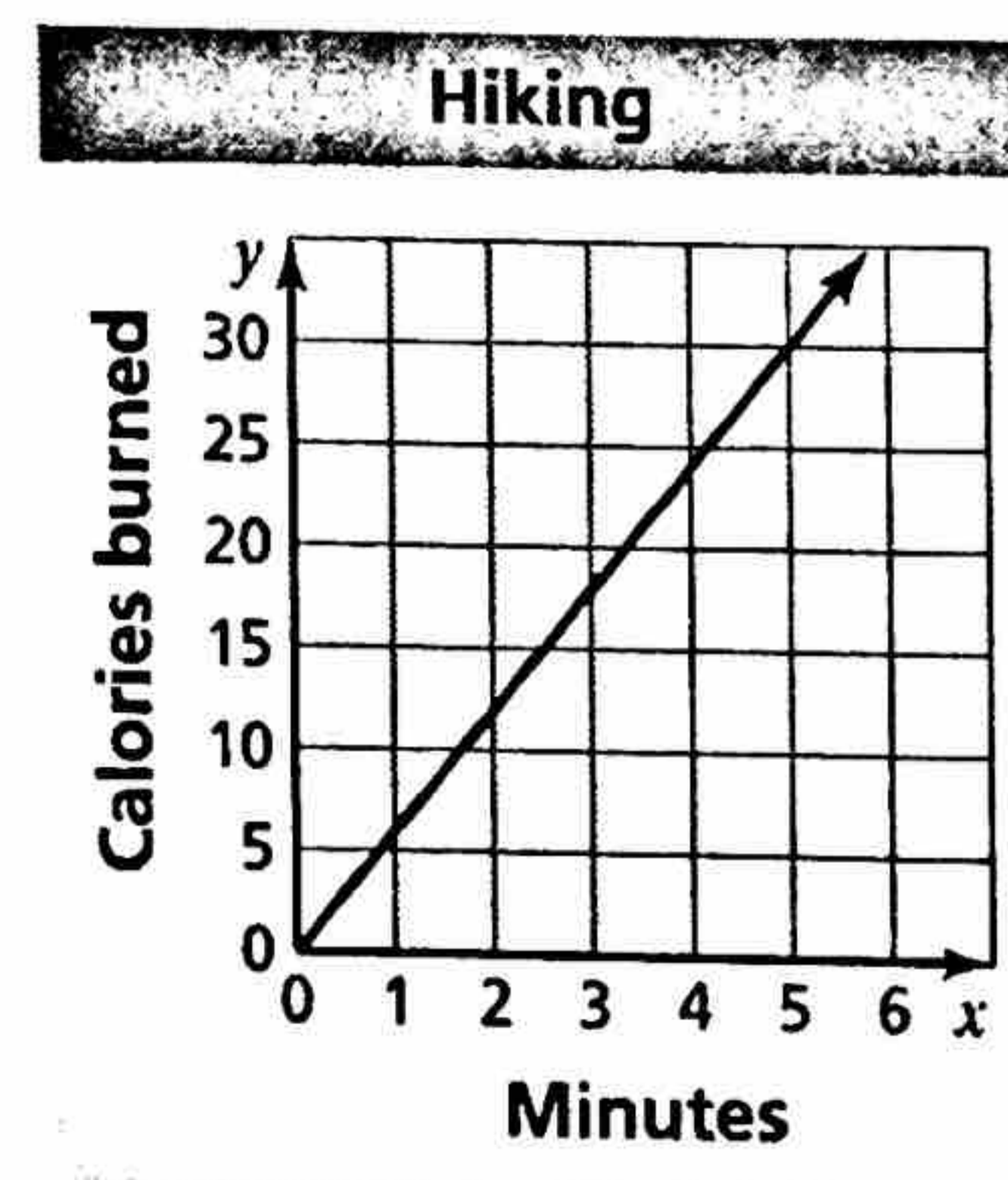
- ④ 14. **RACE** You and a friend race each other. You give your friend a 50-foot head start. The distance y (in feet) your friend runs after x seconds is represented by the linear function $y = 14x + 50$. The table shows the distances you run.

Time (seconds), x	2	4	6	8
Distance (feet), y	38	76	114	152

- Who runs at a faster rate? What is that rate?
- Write a linear function that relates your distance to the number of seconds. In the same coordinate plane, graph the linear functions that represent the distances of you and your friend.
- For what distances will you win the race? Explain.

15. **CALORIES** The number of calories burned y after x minutes of kayaking is represented by the linear function $y = 4.5x$. The graph shows the calories burned by hiking.

- Which activity burns more calories per minute?
- How many more calories are burned by doing the activity in part (a) than the other activity for 45 minutes?



6.4 Exercises

Vocabulary and Concept Check

- VOCABULARY** Describe how linear functions and nonlinear functions are different.
- WHICH ONE DOESN'T BELONG?** Which equation does *not* belong with the other three? Explain your reasoning.

$$5y = 2x$$

$$y = \frac{2}{5}x$$

$$10y = 4x$$

$$5xy = 2$$

Practice and Problem Solving

Graph the data in the table. Decide whether the graph is *linear* or *nonlinear*.

3.

x	0	1	2	3
y	4	8	12	16

4.

x	1	2	3	4
y	1	2	6	24

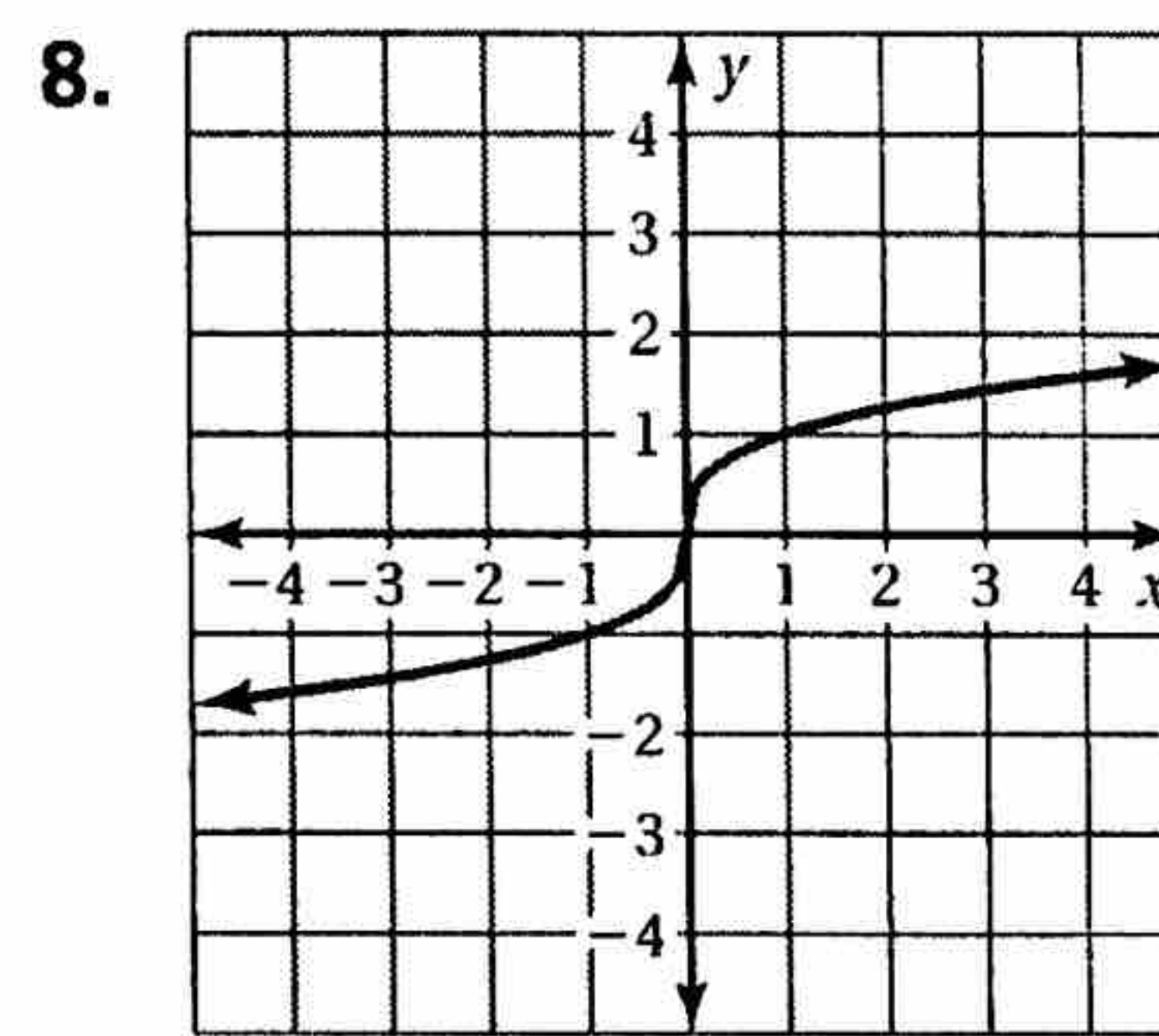
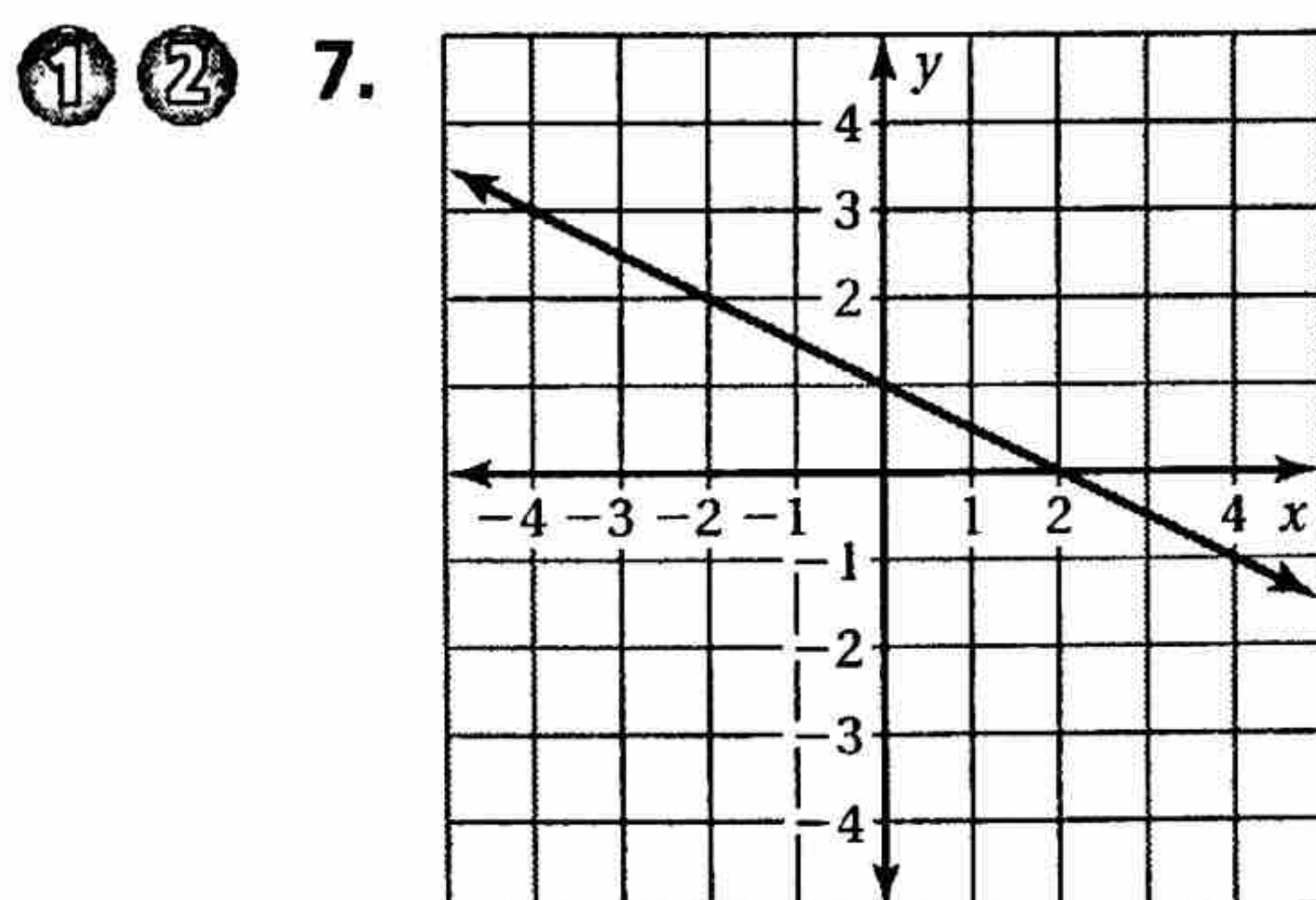
5.

x	6	5	4	3
y	21	15	10	6

6.

x	-1	0	1	2
y	-7	-3	1	5

Does the table or graph represent a *linear* or *nonlinear* function? Explain.



9.

x	5	11	17	23
y	7	11	15	19

10.

x	-3	-1	1	3
y	9	1	1	9

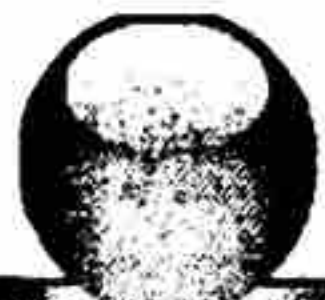



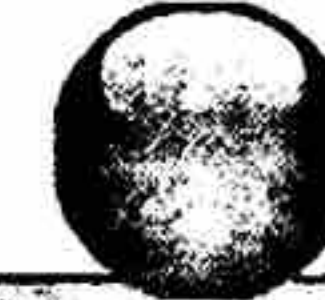
11. **VOLUME** The table shows the volume V (in cubic feet) of a cube with an edge length of x feet. Does the table represent a linear or nonlinear function? Explain.

Edge Length, x	1	2	3	4	5	6	7	8
Volume, V	1	8	27	64	125	216	343	512

Does the equation represent a *linear* or *nonlinear* function? Explain.

12. $2x + 3y = 7$ 13. $y + x = 4x + 5$ 14. $y = \frac{8}{x^2}$

15. **LIGHT** The frequency y (in terahertz) of a light wave is a function of its wavelength x (in nanometers). Does the table represent a linear or nonlinear function? Explain.

					
Color	Red	Yellow	Green	Blue	Violet
Wavelength, x	660	595	530	465	400
Frequency, y	454	504	566	645	749

16. **MODELING** The table shows the cost y (in dollars) of x pounds of sunflower seeds.

Pounds, x	Cost, y
2	2.80
3	?
4	5.60

- What is the missing y -value that makes the table represent a linear function?
- Write a linear function that represents the cost y of x pounds of seeds. Interpret the slope.
- Does the function have a maximum value? Explain your reasoning.

17. **TREES** Tree A is 5 feet tall and grows at a rate of 1.5 feet per year. The table shows the height h (in feet) of Tree B after x years.

Years, x	Height, h
0	5
1	11
4	17
9	23

- Does the table represent a linear or nonlinear function? Explain.
- Which tree is taller after 10 years? Explain.

18. **Number Sense** The ordered pairs represent a function.

$(0, -1), (1, 0), (2, 3), (3, 8),$ and $(4, 15)$

- Graph the ordered pairs and describe the pattern. Is the function linear or nonlinear?
- Write an equation that represents the function.



Fair Game Review

What you learned in previous grades & lessons

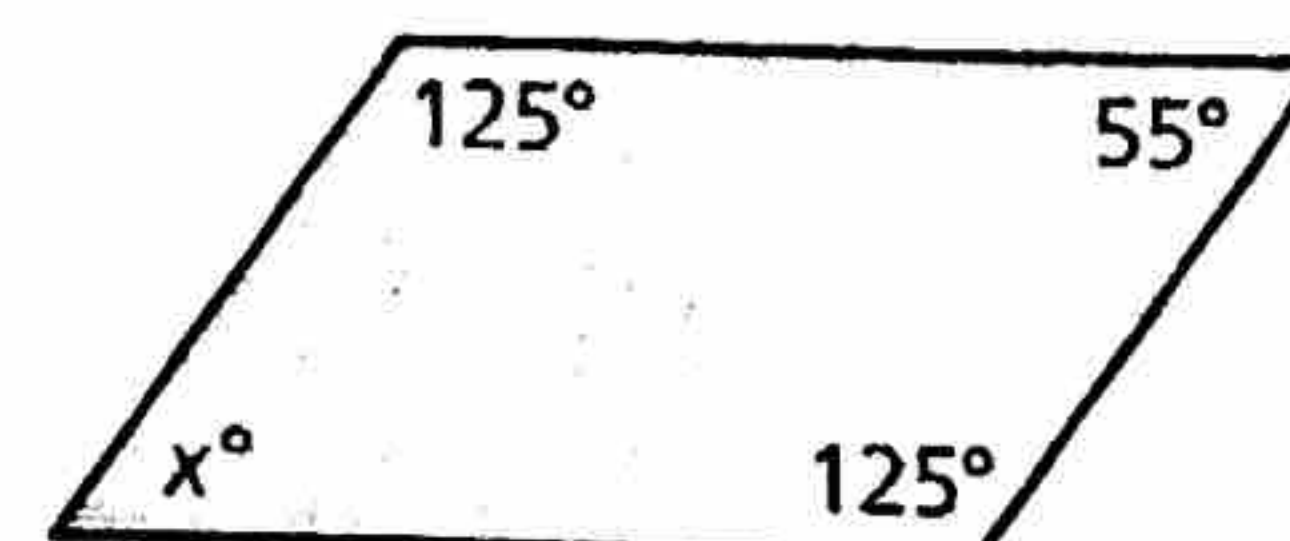
The vertices of a figure are given. Draw the figure and its image after a dilation with the given scale factor k . Identify the type of dilation. (Section 2.7)

19. $A(-3, 1), B(-1, 3), C(-1, 1); k = 3$

20. $J(-8, -4), K(2, -4), L(6, -10), M(-8, -10); k = \frac{1}{4}$

21. **MULTIPLE CHOICE** What is the value of x ? (Section 3.3)

- (A) 25 (B) 35
(C) 55 (D) 125

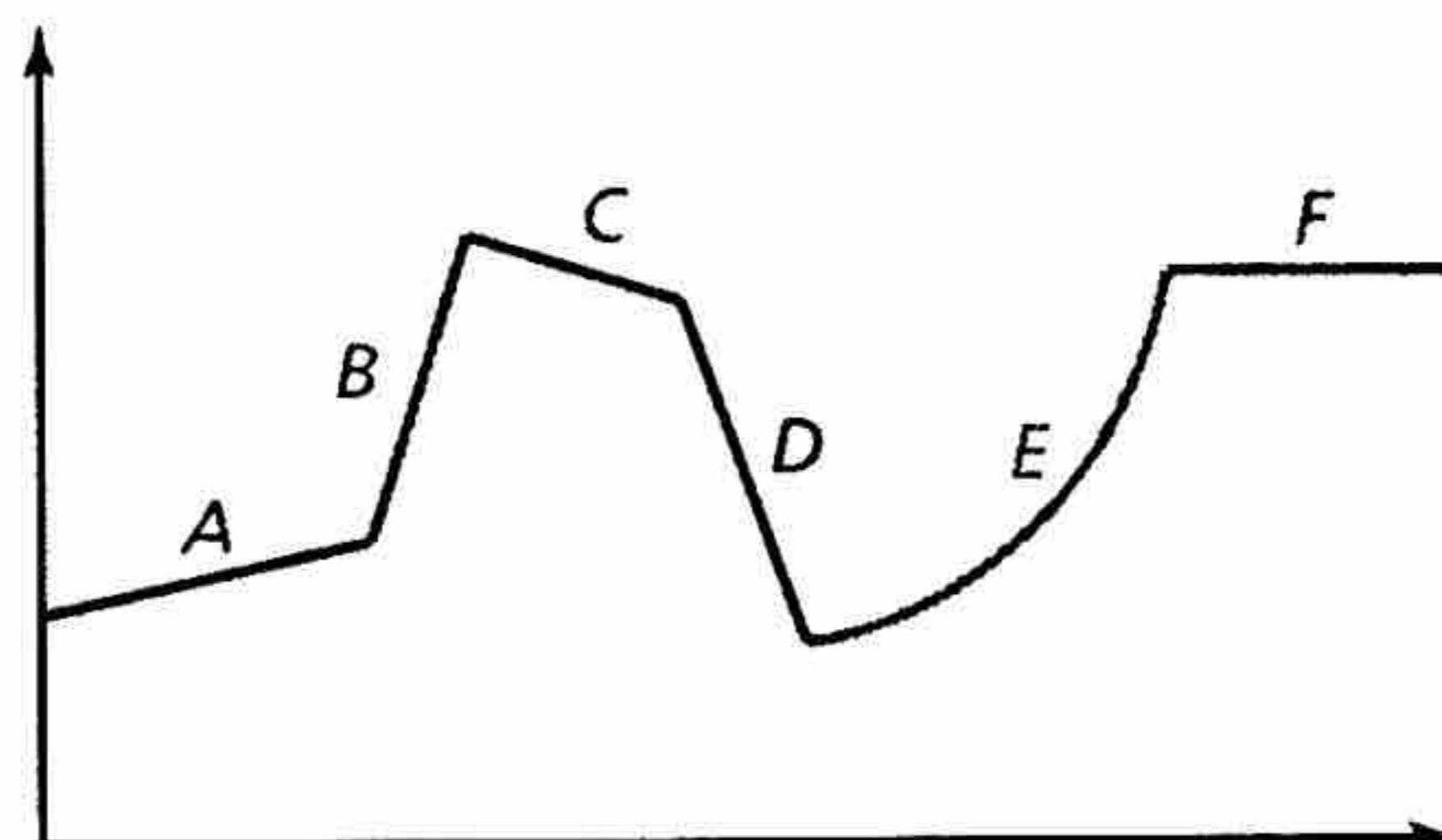


6.5 Exercises

Vocabulary and Concept Check

MATCHING Match the verbal description with the part of the graph it describes.

1. stays the same
2. slowly decreases at a constant rate
3. slowly increases at a constant rate
4. increases at an increasing rate
5. quickly decreases at a constant rate
6. quickly increases at a constant rate



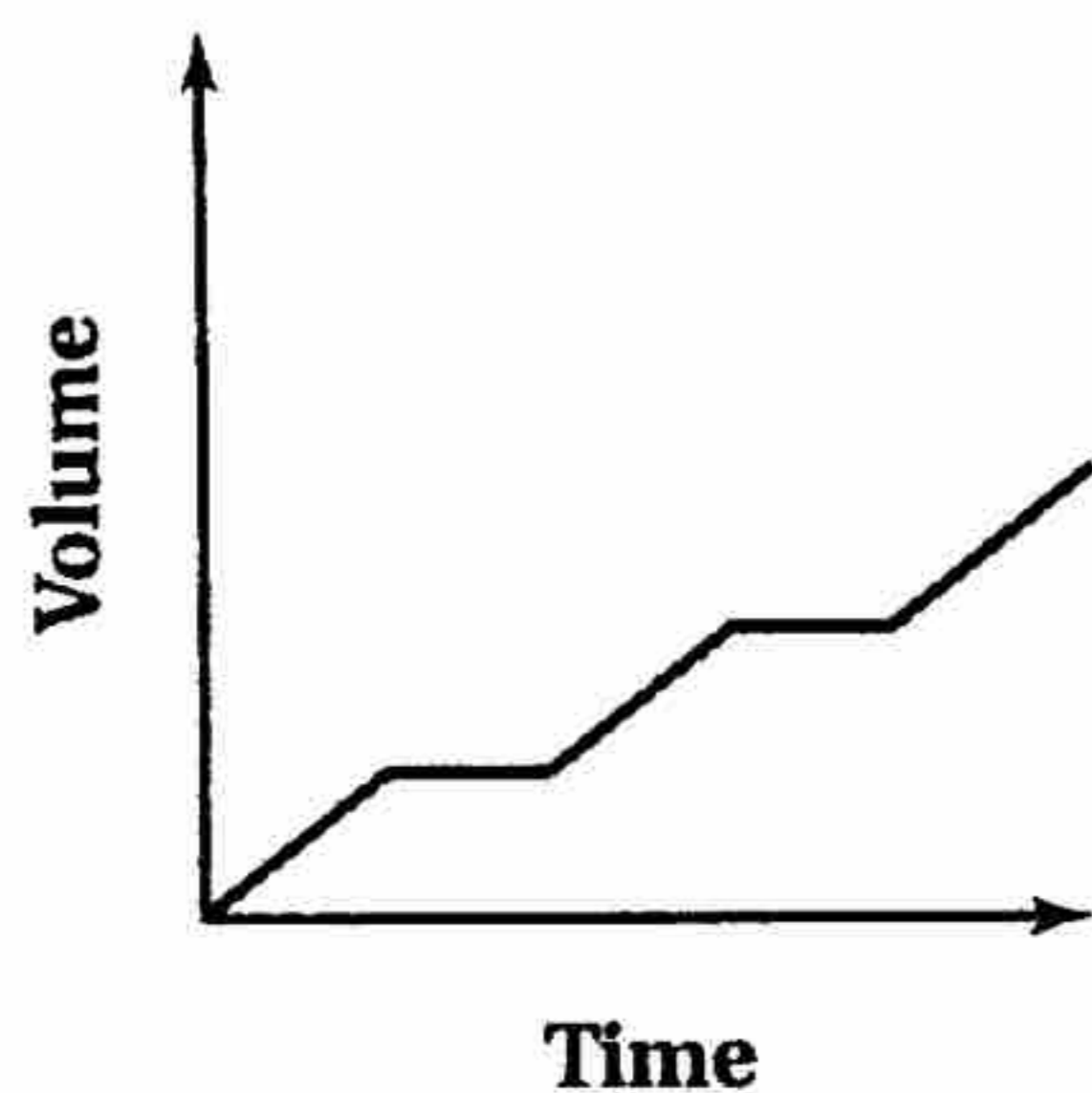
Practice and Problem Solving

Describe the relationship between the two quantities.



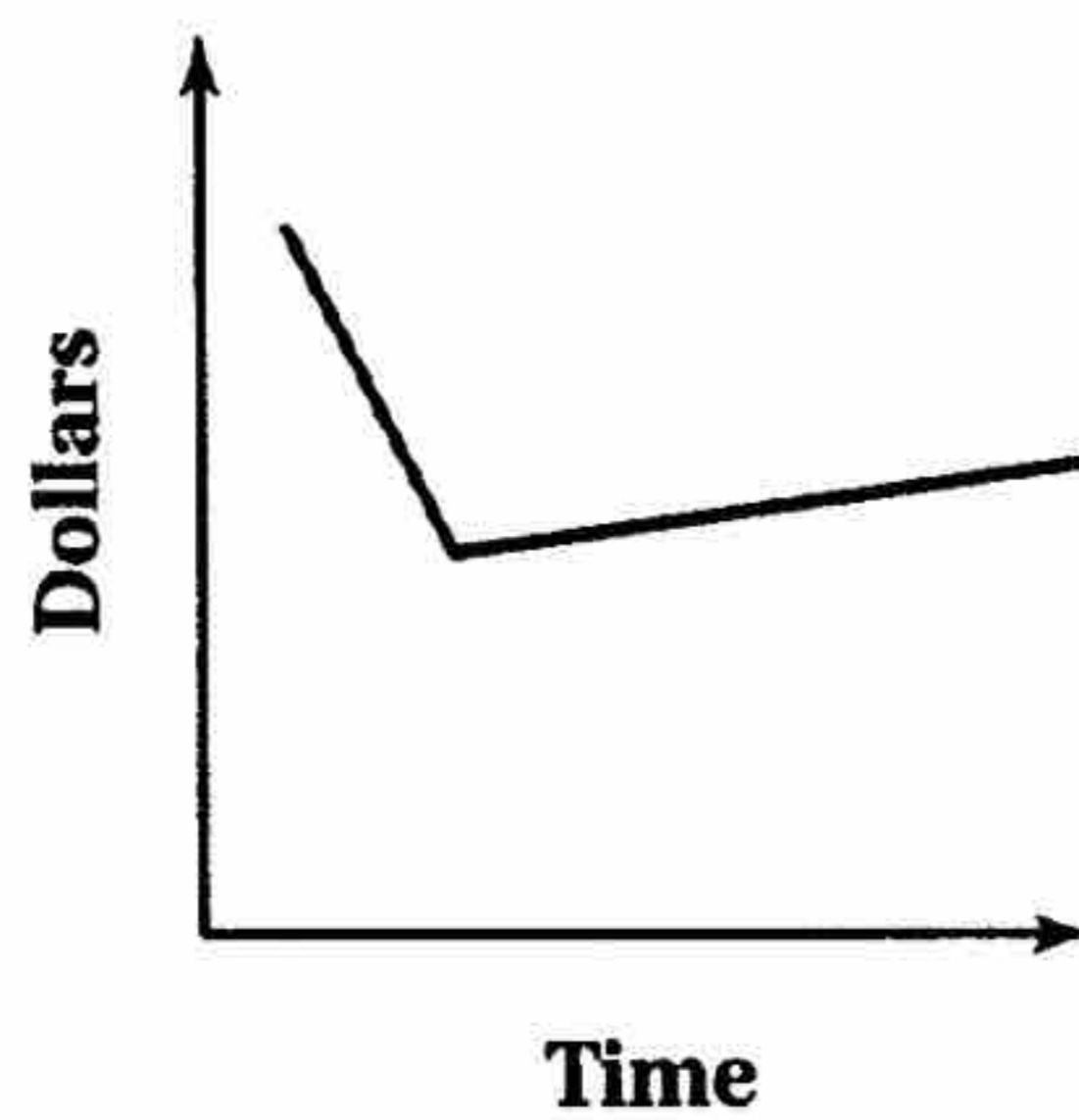
7.

Balloon



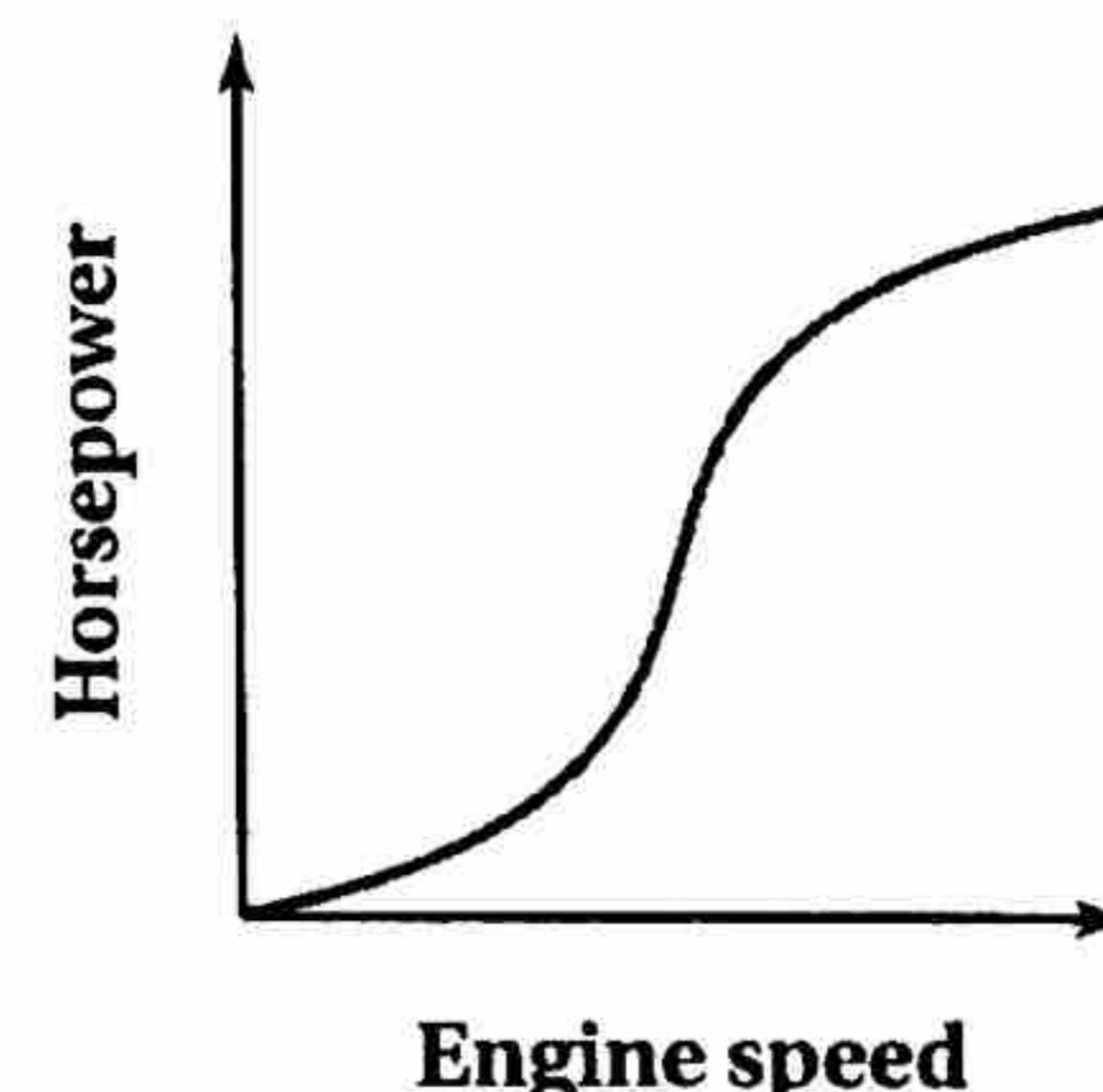
8.

Sales



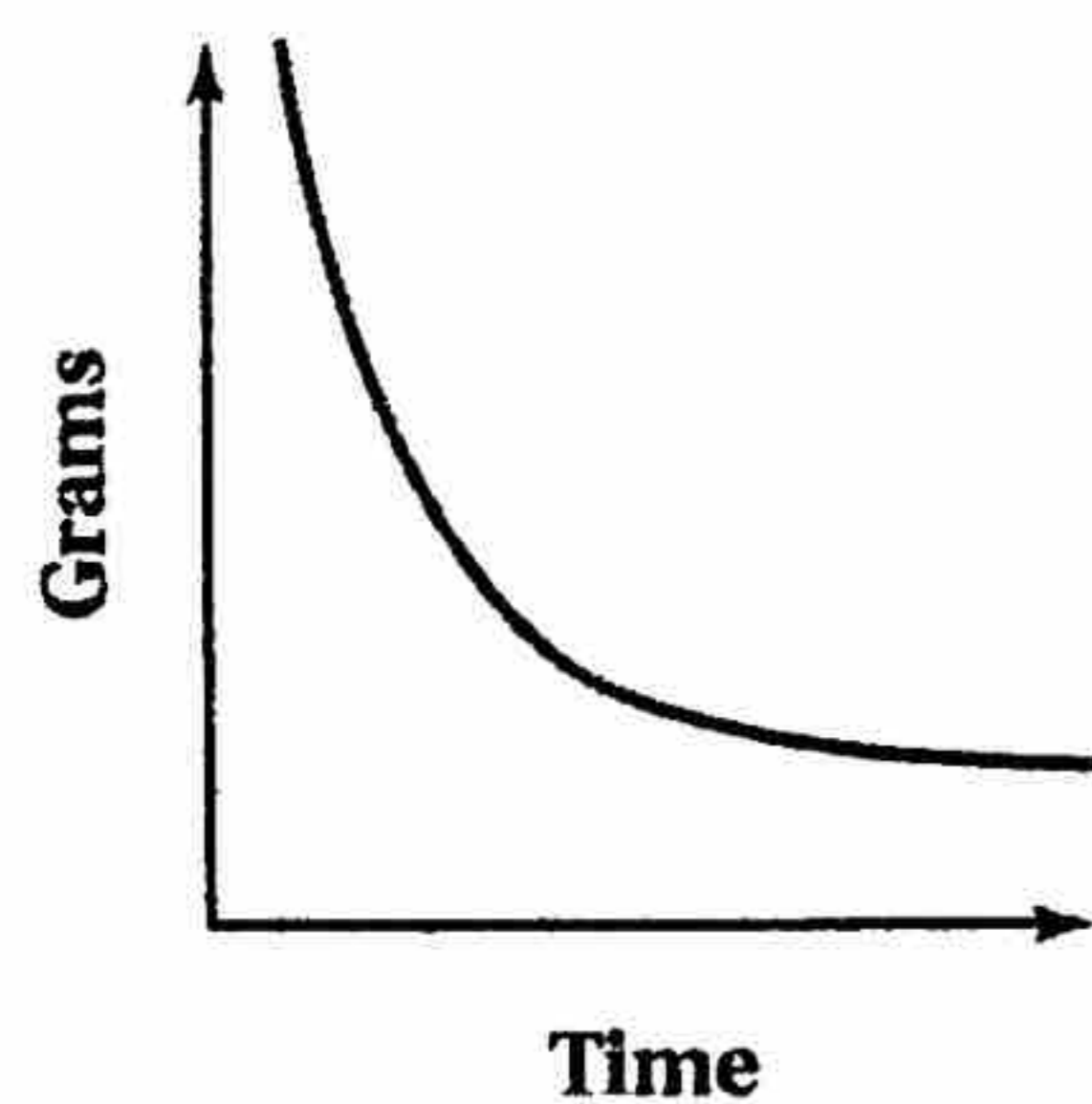
9.

Engine Power



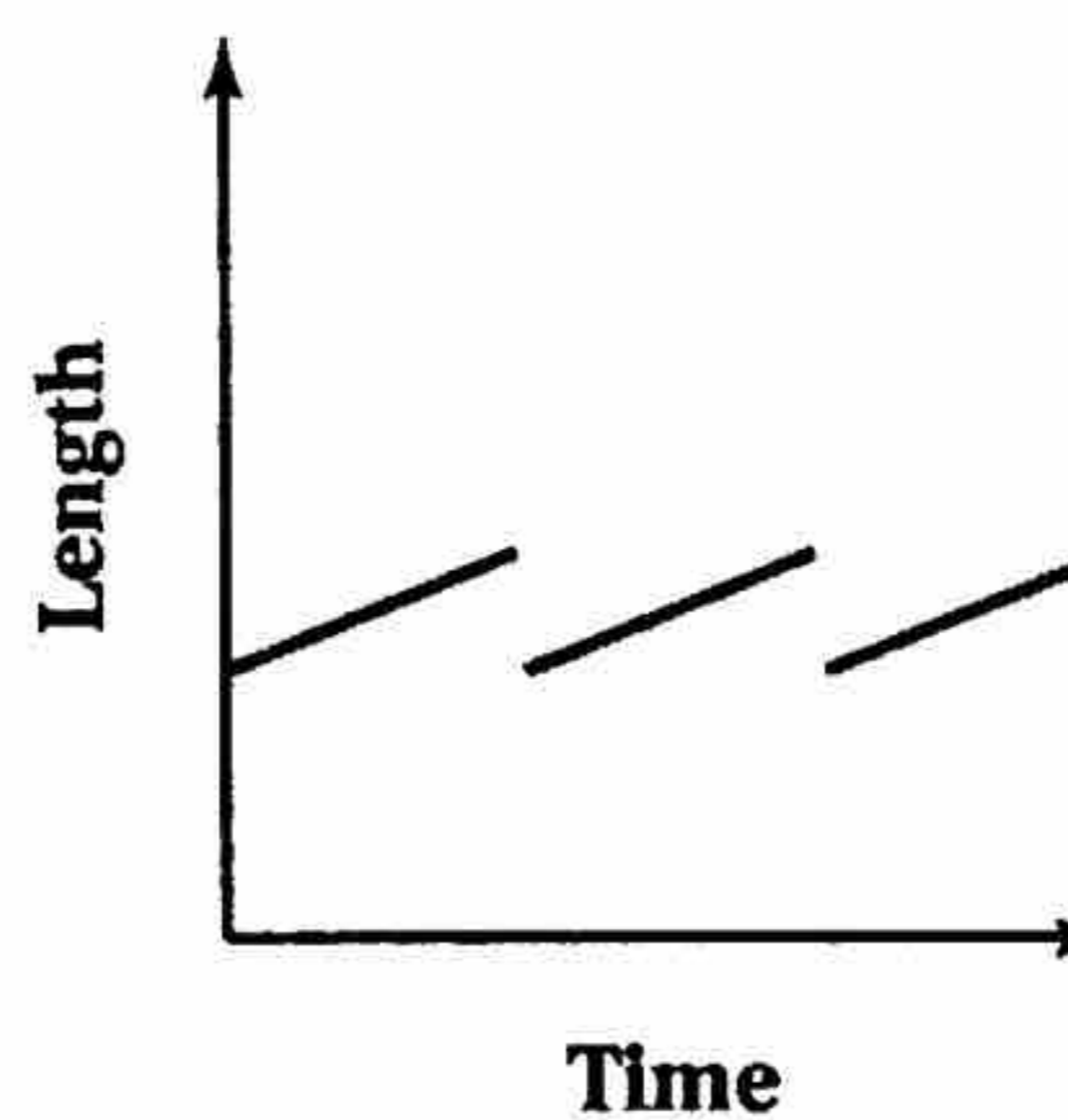
10.

Decay



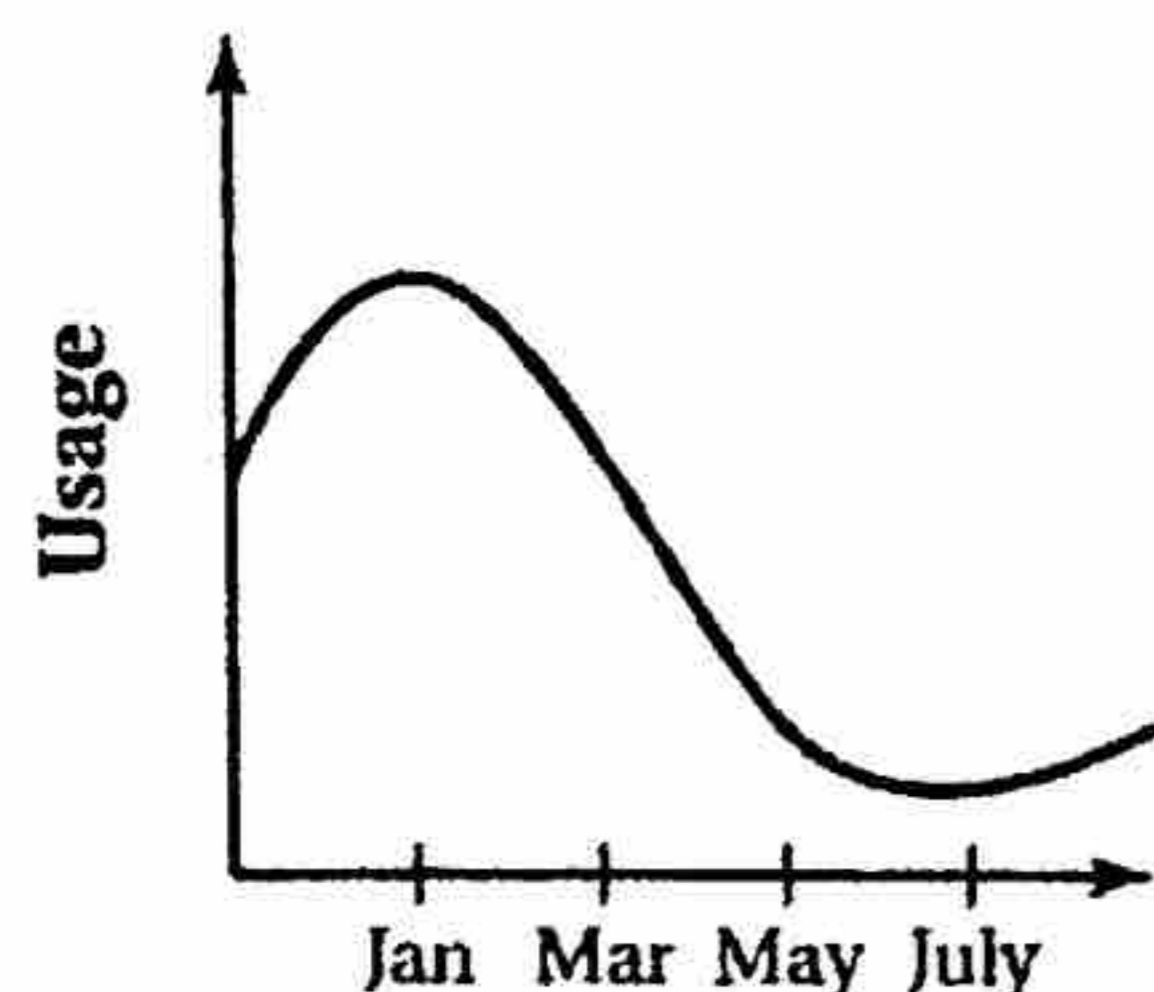
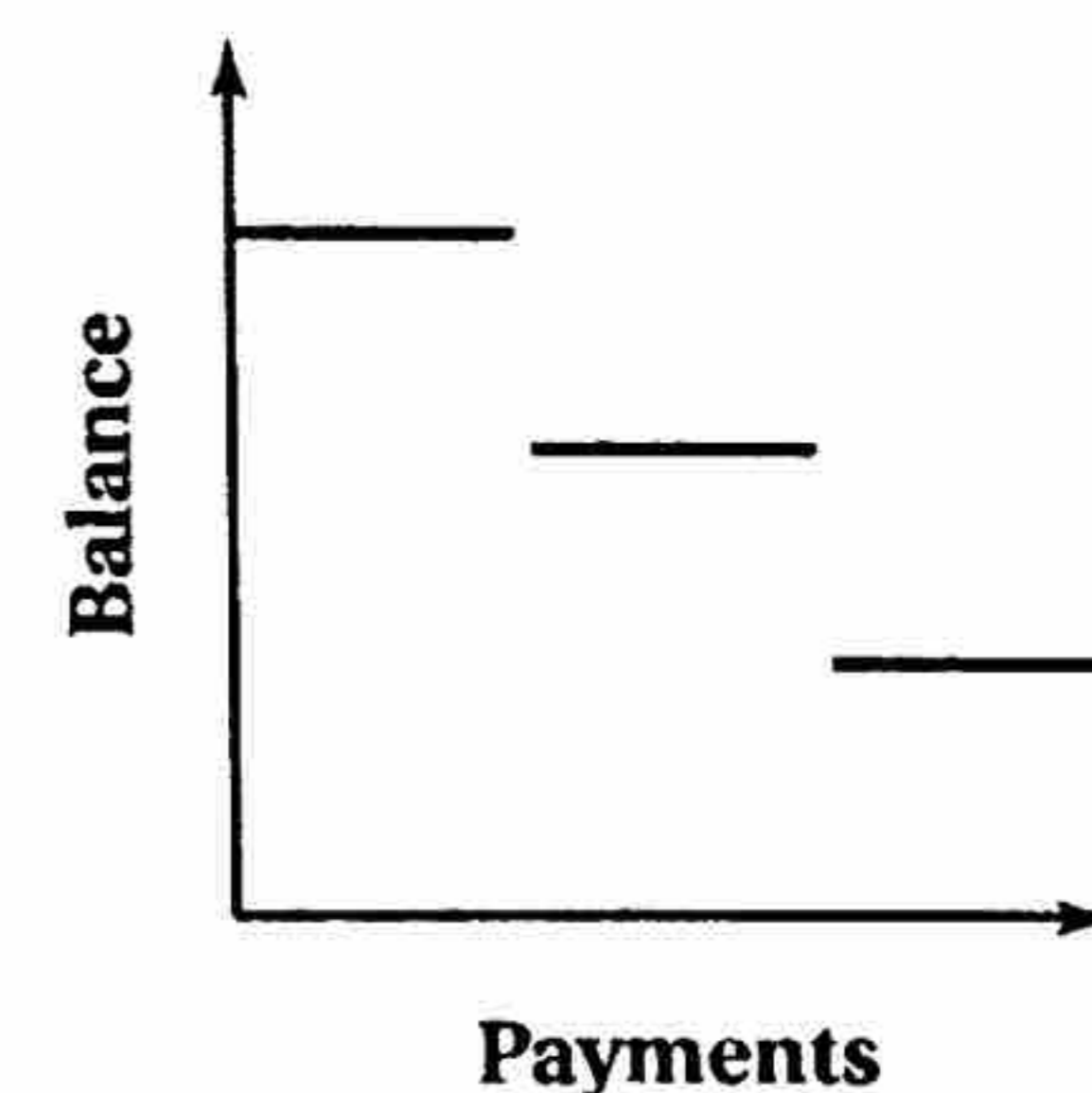
11.

Hair



12.

Loan



13. **NATURAL GAS** The graph shows the natural gas usage for a house.

- a. Describe the change in usage from January to March.
- b. Describe the change in usage from March to May.

14. **REASONING** The graph shows two bowlers' averages during a bowling season.

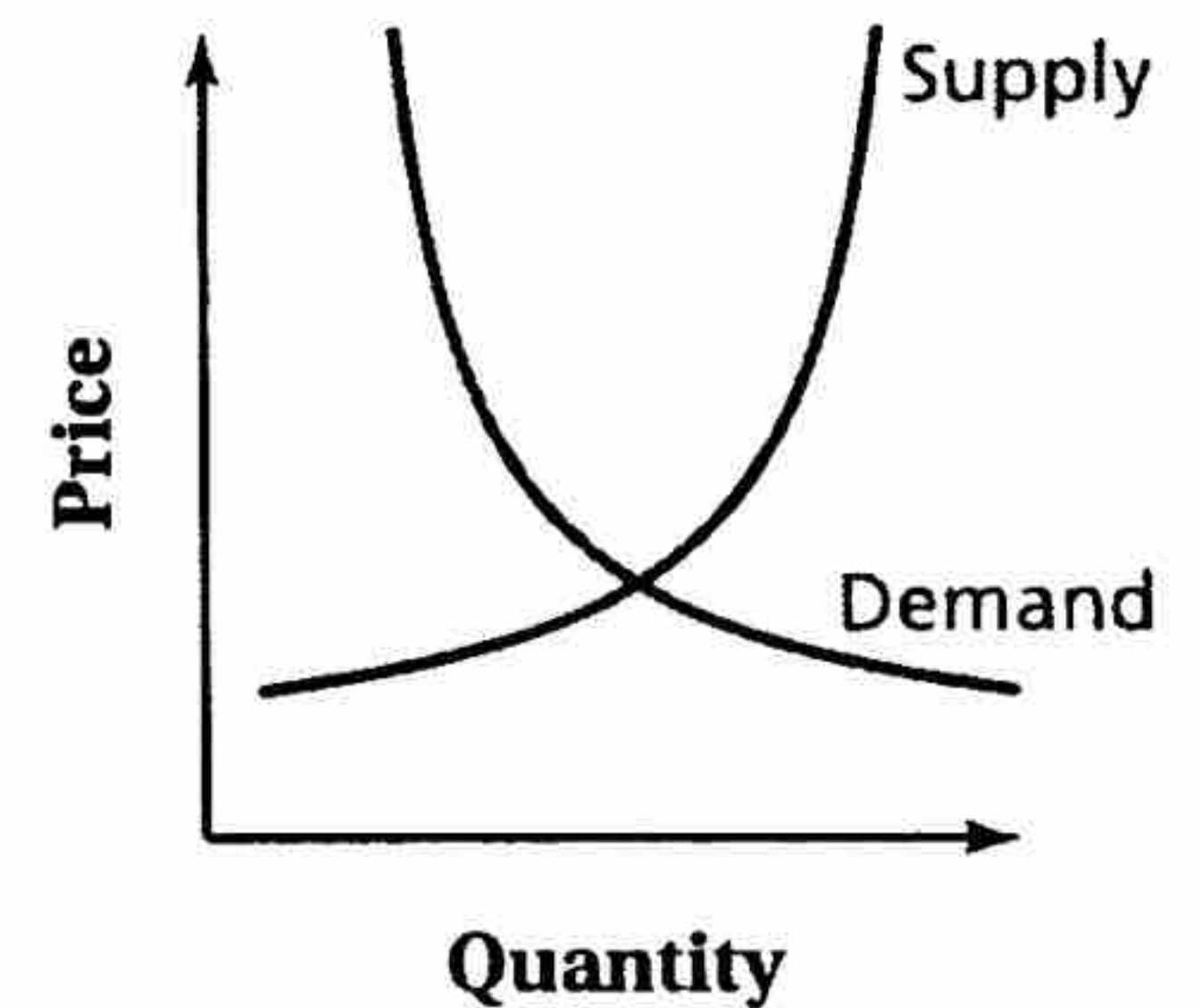
- Describe each bowler's performance.
- Who had a greater average most of the season?
Who had a greater average at the end of the season?



Sketch a graph that represents the situation.

- The value of a car depreciates. The value decreases quickly at first and then more slowly.
- The distance from the ground changes as your friend swings on a swing.
- The value of a rare coin increases at an increasing rate.
- You are typing at a constant rate. You pause to think about your next paragraph, and then you resume typing at the same constant rate.

19. **Economics** You can use a *supply and demand model* to understand how the price of a product changes in a market. The *supply curve* of a particular product represents the quantity suppliers will produce at various prices. The *demand curve* for the product represents the quantity consumers are willing to buy at various prices.



- Describe and interpret each curve.
- Which part of the graph represents a surplus?
a shortage? Explain your reasoning.
- The curves intersect at the *equilibrium point*, which is where the quantity produced equals the quantity demanded. Suppose that demand for a product suddenly increases, causing the entire demand curve to shift to the right. What happens to the equilibrium point?



Fair Game Review

what you learned in previous grades & lessons

Solve the system of linear equations by graphing. (Section 5.1)

20. $y = x + 2$

$y = -x - 4$

21. $x - y = 3$

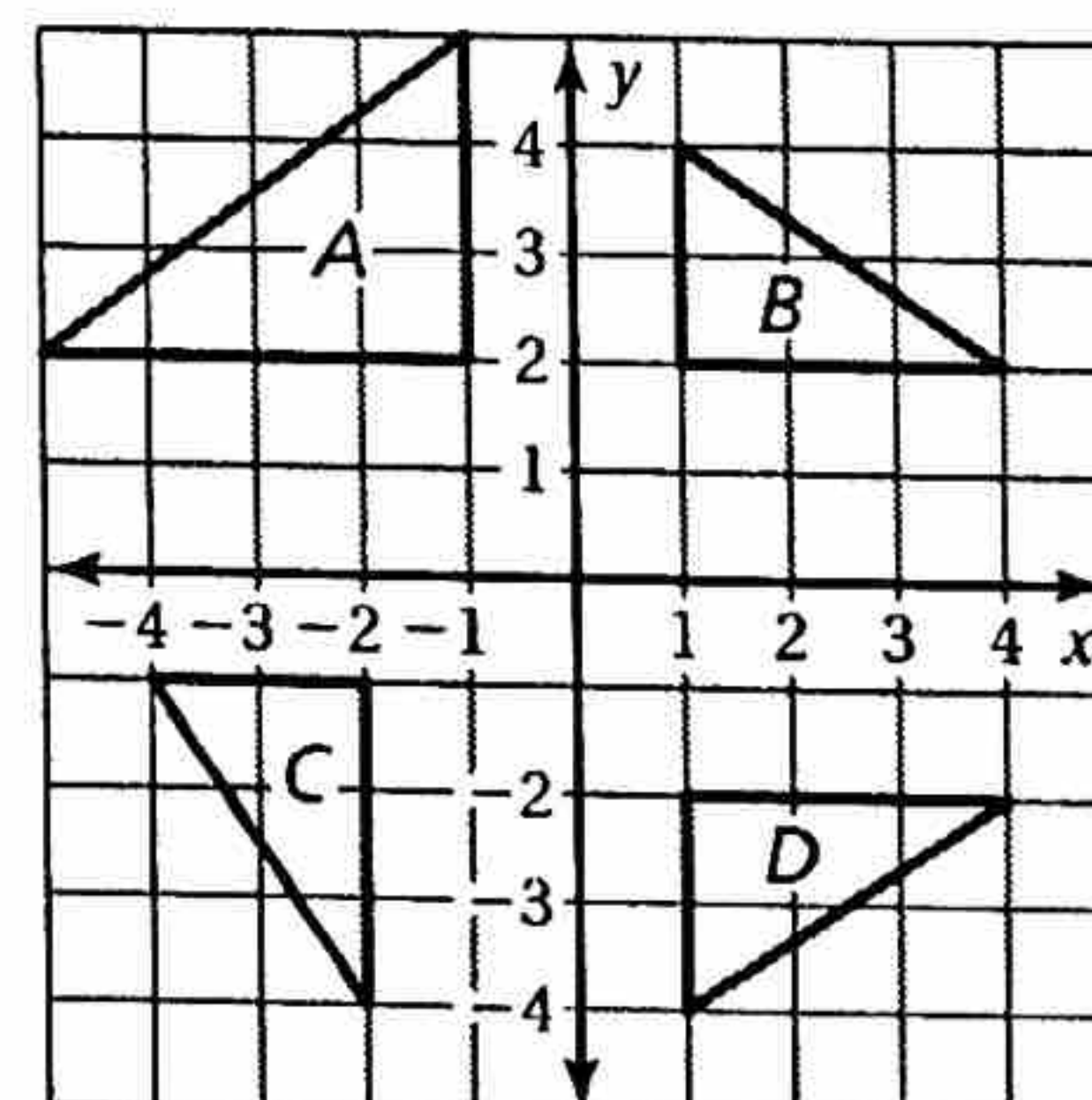
$-2x + y = -5$

22. $3x + 2y = 2$

$5x - 3y = -22$

23. **MULTIPLE CHOICE** Which triangle is a rotation of Triangle D? (Section 2.4)

- Triangle A
- Triangle B
- Triangle C
- none



Define, evaluate, and compare functions.

MAFS.8.F.1.1 Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.

MAFS.8.F.1.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

MAFS.8.F.1.3 Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.

Use functions to model relationships between quantities.

MAFS.8.F.2.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

MAFS.8.F.2.5 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

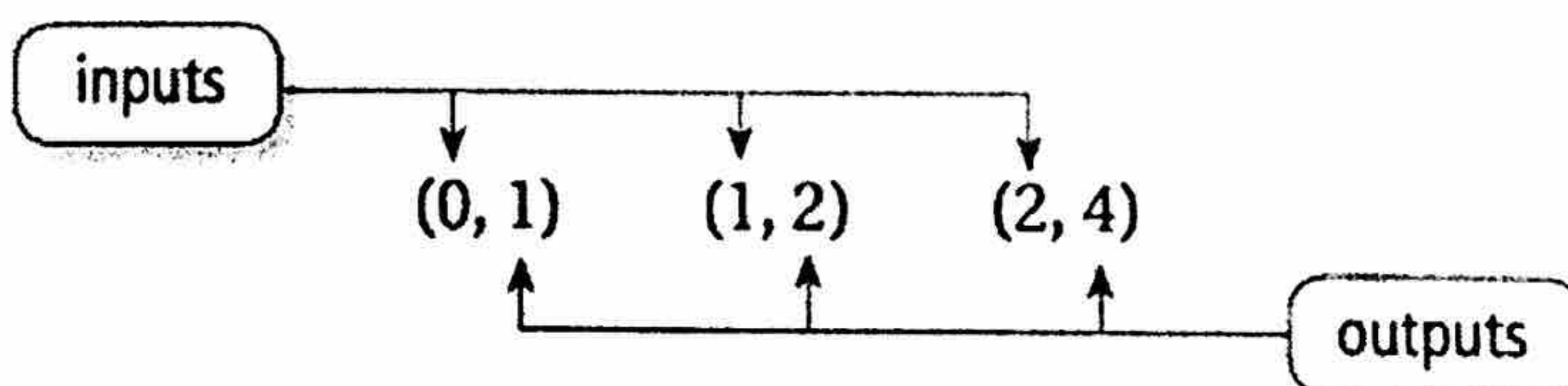
Essential Question

How can you use a mapping diagram to show the relationships between two data sets?

In this lesson I am learning how to read mapping diagrams, so I can show the relationships between two data sets.

**6.1
Relations and Functions**

Ordered pairs can be used to show inputs and outputs.



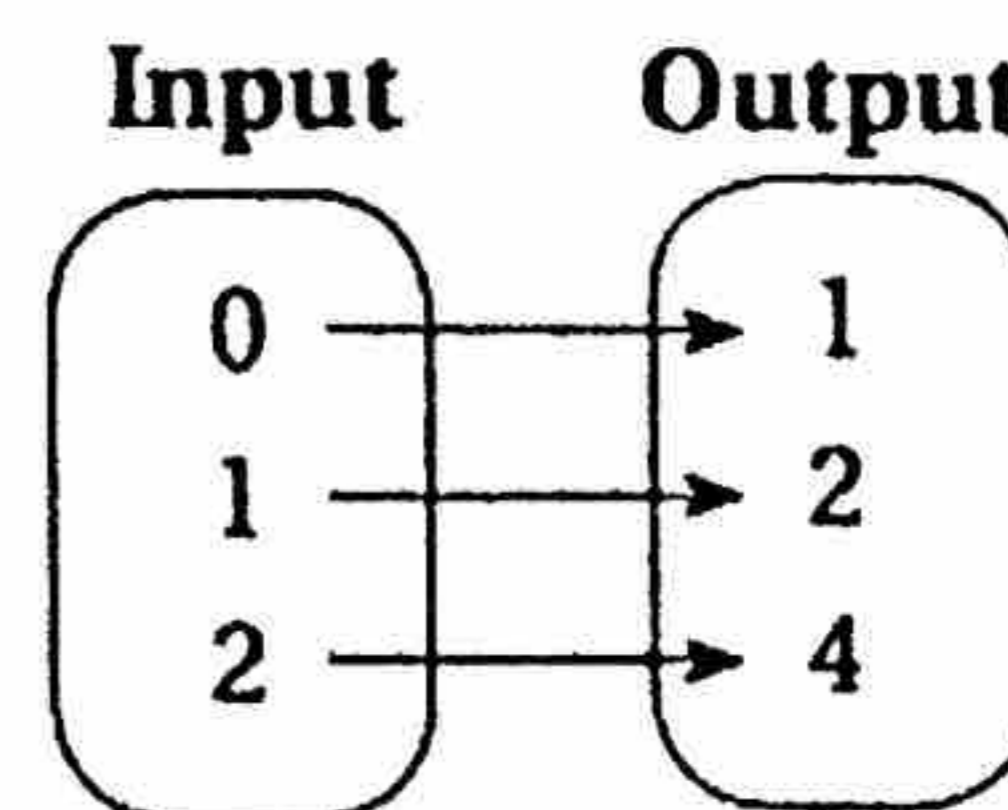
Relations and Mapping Diagrams

A relation pairs inputs with outputs. A relation can be represented by ordered pairs or a mapping diagram.

Ordered Pairs

- (0, 1)
- (1, 2)
- (2, 4)

Mapping Diagram



A relation that pairs each input with *exactly one* output is a function.